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SUPERVIVENCIA DE EMPRESAS EN ECONOMÍAS EMERGENTES DESDE UNA PERSPECTIVA DE GÉNERO: EFECTO DE LAS POLÍTICAS PÚBLICAS Y LOS RECURSOS EN SECTORES DE ALTO CRECIMIENTO Y CLEANTECH

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RESUMEN

Esta tesis doctoral se compone de dos estudios empíricos que analizan la supervivencia de empresas de alto crecimiento en Chile, desde una perspectiva de género.

El primer artículo examina si existen diferencias en la probabilidad de permanencia en el mercado entre empresas emergentes lideradas por hombres y mujeres que han recibido apoyo público. A través de un modelo de riesgos proporcionales de Cox aplicado a empresas apoyadas por Corfo, se estima la sobrevivencia —medida como el tiempo hasta el cese de sus actividades—, junto con el efecto del género y del financiamiento inicial. Los resultados muestran que las empresas emergentes lideradas por mujeres presentan tasas de supervivencia más altas que aquellas lideradas por hombres, con una reducción del 42,57 % en el riesgo de fracaso (HR = 0,5743; $p < 0,01$). Este efecto es estadísticamente significativo al 1 %, equivalente a un nivel de confianza del 99 %. Asimismo, cada aumento del 1 % en el financiamiento recibido se asocia con una reducción del 40,93 % en el riesgo de fracaso empresarial (HR = 0,5907; $p < 0,001$), efecto estadísticamente significativo al 0,1 %, equivalente a un nivel de confianza del 99,9 %. En consecuencia, los resultados evidencian que tanto el liderazgo femenino como el mayor acceso a financiamiento público reducen significativamente la probabilidad de cese de las empresas emergentes.

El segundo artículo profundiza el análisis en el sector cleantech (energías limpias), incorporando un modelo de supervivencia que permite distinguir entre emprendimientos resilientes y vulnerables. En este contexto, se observa que las empresas lideradas por mujeres presentan una mayor probabilidad de fracaso (HR=1,62), evidenciando que las dinámicas de género varían según el sector productivo. El análisis de clúster identifica perfiles diferenciados en función de su dotación de recursos, mientras que la evaluación cuasi-experimental de un programa de aceleración demuestra mejoras significativas en habilidades emprendedoras y autoconfianza mediante la conformación de una Comunidad de Práctica.

En conjunto, ambos estudios permiten avanzar desde la identificación de brechas en supervivencia hacia la comprensión de los mecanismos que las explican, integrando el enfoque de género con la Teoría de los Recursos (RBV) y aportando evidencia relevante para el diseño de políticas públicas más equitativas. Esta investigación contribuye a la literatura sobre gestión estratégica al ofrecer evidencia de los efectos positivos de la diversidad de género en el liderazgo y los recursos financieros en la supervivencia de las empresas de alto

crecimiento. En el contexto de economías emergentes, se estimó la ventaja que tienen las empresas lideradas por mujeres, sustentándose en la evidencia previa y en la importancia de considerar los diversos patrones de supervivencia empresarial en emprendimientos cleantech. En este marco, se especifican las condiciones bajo las cuales el liderazgo femenino predice la resiliencia empresarial e investigando si intervenciones estructuradas de desarrollo emprendedor modifican variables psicológicas de resiliencia.

ABSTRACT

This doctoral thesis comprises two empirical studies that examine the survival of high-growth firms in Chile from a gender perspective.

The first article examines whether there are differences in the probability of remaining in the market between publicly supported startups led by men and women. Using a Cox proportional hazards model applied to firms supported by Corfo, the study estimates survival—measured as the time until business cessation—together with the effects of gender and initial funding. The results show that women-led startups exhibit higher survival rates than men-led startups, with a 42.57% reduction in the risk of failure ($HR = 0.5743$; $p < 0.01$). This effect is statistically significant at the 1% level, corresponding to a 99% confidence level. Likewise, each 1% increase in the amount of funding received is associated with a 40.93% reduction in the risk of business failure ($HR = 0.5907$; $p < 0.001$), an effect that is statistically significant at the 0.1% level, corresponding to a 99.9% confidence level. Accordingly, the findings show that both female leadership and greater access to public funding significantly reduce the likelihood of startup cessation.

The second article deepens the analysis by focusing on the cleantech sector, incorporating a survival model that distinguishes between resilient and vulnerable ventures. In this context, women-led firms are found to have a higher probability of failure ($HR = 1.62$), indicating that gender dynamics vary across productive sectors. The cluster analysis identifies differentiated firm profiles according to their resource endowments, while the quasi-experimental evaluation of an acceleration program demonstrates significant improvements in entrepreneurial skills and self-confidence through the formation of a Community of Practice.

Taken together, both studies advance the analysis from the identification of survival gaps toward a deeper understanding of the mechanisms that explain them, integrating a gender perspective with the Resource-Based View (RBV) and providing relevant evidence for the design of more equitable public policies. This research contributes to the strategic management literature by offering evidence on the positive effects of gender diversity in leadership and financial resources on the survival of high-growth firms. In the context of emerging economies, the thesis estimates the advantage associated with women-led firms, building on prior evidence and highlighting the importance of considering heterogeneous

patterns of business survival in cleantech ventures. Within this framework, the study specifies the conditions under which female leadership predicts entrepreneurial resilience and examines whether structured entrepreneurial development interventions modify psychological variables associated with resilience.

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CAPÍTULO 1

Introducción

La presente tesis doctoral analiza los factores que inciden en la supervivencia de empresas de alto crecimiento en economías emergentes, tomando a Chile como caso de estudio, incorporando una perspectiva de género como eje analítico central. En este contexto, el género se concibe como una categoría analítica que permite examinar y explicar diferencias en oportunidades, acceso a recursos y resultados en el ámbito emprendedor, reconociendo que dichas diferencias no se explican únicamente por atributos individuales —como habilidades, motivación o experiencia—, sino también por factores sociales, institucionales y culturales que influyen en el funcionamiento del ecosistema empresarial (Ahl & Marlow, 2012; Jennings & Brush, 2013). En consecuencia, el género no se considera como una característica demográfica del fundador, sino como un factor que influye en las trayectorias emprendedoras en interacción con el acceso a recursos y las condiciones del entorno.

En este marco, la literatura ha evidenciado que las mujeres emprendedoras enfrentan restricciones específicas en el acceso a financiamiento, redes y legitimidad, lo que puede afectar sus trayectorias de crecimiento y supervivencia empresarial, particularmente durante las etapas iniciales del ciclo de vida empresarial (Brush et al., 2018; Kanze et al., 2017). Sin embargo, la evidencia empírica sobre desempeño y supervivencia presenta resultados heterogéneos, dando lugar a debates en torno a la denominada "hipótesis de bajo rendimiento", la cual sostiene que las empresas lideradas por mujeres presentan, en promedio, menores niveles de desempeño que aquellas lideradas por hombres, medidos a través de indicadores como crecimiento, rentabilidad, tamaño o acceso a financiamiento (Kiefer et al., 2020; Yang & del Carmen Triana, 2019; Amoroso & Link, 2017; Boden & Nucci, 2000).

En este sentido, el presente estudio se inserta en dicho debate, buscando aportar evidencia que permita comprender bajo cuáles condiciones esta relación se mantiene, se revierte o desaparece.

Para efectos de esta investigación, las empresas de alto crecimiento se definen como aquellas con potencial ex ante de escalabilidad, innovación y rápida generación de empleo,

siendo generalmente identificadas a través de programas públicos competitivos que evalúan su proyección en función de la oportunidad de mercado, la experiencia del equipo emprendedor y el grado de diferenciación tecnológica (OECD, 2010; Kuschel et al., 2020; Kuschel & Lepeley, 2016).

Asimismo, se incorpora el análisis del sector cleantech, caracterizado por su orientación al desarrollo de soluciones tecnológicas sostenibles. En este contexto, se entiende por empresas cleantech aquellas que producen o comercializan bienes, servicios o procesos que generan valor mediante un uso limitado o nulo de recursos no renovables y/o que reducen significativamente la generación de residuos en comparación con alternativas convencionales (Pernick & Wilder, 2007). De este modo, la industria cleantech abarca una amplia gama de actividades, incluyendo reciclaje, energías renovables (energía eólica, solar, biomasa, hidroeléctrica y biocombustibles), tecnologías de la información, transporte sostenible, motores eléctricos, química verde, materiales avanzados, sistemas de iluminación eficiente y economía circular (Cumming et al., 2016). Este sector presenta un alto potencial en términos de retornos financieros y de impacto productivo. Además, debido a la creciente conciencia y preocupación por el cambio climático, las empresas cleantech han adquirido mayor atractivo para los inversionistas privados ya que promueven la creación de empleo y la transición hacia economías más sostenibles (Burtis et al., 2004).

El marco conceptual de esta investigación se sustenta en la integración de "liability of newness" (Stinchcombe, 1965) y la teoría de los recursos ("Resource-Based View" - RBV) (Wernerfelt, 1984; Barney, 1991). La primera teoría, permite comprender la vulnerabilidad de las empresas nacientes frente a la falta de legitimidad y recursos, que les permitan enfrentar los riesgos inherentes a sus etapas iniciales. La segunda teoría, establece que la supervivencia y desempeño, dependen de la capacidad de las empresas para acceder, combinar y explotar recursos estratégicos (internos y externos) valiosos, raros inimitables y organizacionalmente integrados (VRIO). En este contexto, el género se incorpora como un elemento que puede influir en el acceso y uso de dichos recursos, en interacción con el entorno y las condiciones del ecosistema.

A partir de esta integración, la tesis plantea que la supervivencia empresarial se explica por la interacción entre la disponibilidad de recursos —financieros, humanos, sociales y psicológicos—, las características del entorno y el rol de las políticas públicas de

apoyo al emprendimiento. En particular, el financiamiento público no solo actúa como un recurso económico, sino también como un mecanismo que facilita el acceso a redes, genera legitimidad y reduce la incertidumbre inicial de las empresas.

En Chile, este análisis adquiere especial relevancia considerando una alta tasa de mortalidad en emprendimientos de alto crecimiento y un incremento sostenido en la inversión pública orientada a este tipo de iniciativas. En este contexto, la participación femenina en empresas de base científico-tecnológica continúa siendo limitada, representando solo el 11,2% del total de empresas en ciencia y tecnología (Ministerio de Ciencia, Tecnología, Conocimiento e Innovación, 2021). Esta baja participación, en un entorno caracterizado por elevados niveles de incertidumbre y exigencias de crecimiento, plantea interrogantes respecto a las condiciones de acceso, desarrollo y permanencia de las mujeres en estos ecosistemas.

Adicionalmente, el dinamismo del sector cleantech introduce un contexto particularmente exigente en términos tecnológicos, financieros y regulatorios. Entre 2010 y 2022, Chile atrajo más de USD 15 mil millones en inversión extranjera directa en energías renovables, consolidando su posición como líder regional en transición energética y posicionándose como actor emergente en exportación de energía verde e hidrógeno renovable (Zamorano, 2024). Este sector constituye un tema estratégico para la investigación actual en emprendimientos, innovación y sostenibilidad, debido a su relevancia ambiental, económica e institucional. En particular, analizar la participación de mujeres en este sector permite no solo identificar brechas en el acceso a recursos y oportunidades, sino también comprender los factores que condicionan su permanencia en el mercado.

En este escenario, persiste una brecha en la literatura respecto a la comprensión de cómo el género se relaciona con la supervivencia empresarial en startups de alto crecimiento, particularmente en economías emergentes. Si bien existen estudios sobre diferencias de desempeño, aún es limitado el conocimiento sobre los mecanismos a través de los cuales el género interactúa con el acceso a recursos, el financiamiento público y las características sectoriales para influir en la probabilidad de supervivencia.

En consecuencia, **el problema de investigación** se define como la necesidad de comprender cómo el género del líder se asocia con la supervivencia de empresas de alto crecimiento en economías emergentes, considerando el rol del financiamiento público, la

disponibilidad de recursos estratégicos y las diferencias entre sectores productivos, especialmente en industrias intensivas en capital como lo es la industria cleantech.

Esta investigación, plantea como objetivo general

Analizar cómo el género del líder influye en la supervivencia de empresas de alto crecimiento en Chile, considerando el efecto del financiamiento público, la disponibilidad de recursos estratégicos y las diferencias sectoriales, particularmente en el ámbito cleantech.

Objetivos específicos

1. Evaluar las diferencias en las tasas de supervivencia entre empresas lideradas por hombres y mujeres en sectores de alto crecimiento, utilizando un enfoque longitudinal basado en modelos de regresión.
2. Analizar el efecto del financiamiento público sobre la probabilidad de supervivencia empresarial y su impacto en la reducción del riesgo de fracaso en startups de alto crecimiento.
3. Profundizar el análisis de la supervivencia empresarial en un contexto sectorial específico, mediante el estudio de empresas cleantech y de las diferencias asociadas al género del líder y a la heterogeneidad en la dotación de recursos.
4. Integrar los resultados de ambos estudios para identificar los mecanismos que explican las diferencias observadas en la supervivencia empresarial según género, considerando el contexto institucional y sectorial.

Para abordar estos objetivos, la tesis se estructura en dos estudios empíricos complementarios. El primero analiza diferencias en la supervivencia de startups de alto crecimiento, evidenciando una menor probabilidad de fracaso en empresas lideradas por mujeres, así como un efecto significativo del financiamiento público en la reducción del riesgo de cese. El segundo estudio examina el sector cleantech, mostrando que estas dinámicas varían según el contexto sectorial y la configuración de recursos, e incorporando el análisis de intervenciones orientadas al fortalecimiento de capacidades emprendedoras.

En conjunto, la tesis contribuye a una comprensión más integrada de la supervivencia empresarial en economías emergentes, incorporando el análisis del género en interacción con

recursos, entorno y políticas públicas, y generando evidencia relevante para el diseño de instrumentos de apoyo más efectivos, inclusivos y pertinentes.

Principales resultados y discusión

La tesis incluye dos investigaciones complementarias, que analizan la supervivencia de las empresas con una mirada de género en una economía en desarrollo como es el caso de Chile. Un primer estudio revisa 888 startups que recibieron apoyo de la Corporación de Fomento para la Producción (Corfo) durante un periodo de ocho años. Se demuestra que las empresas lideradas por mujeres tienen menos probabilidad de fracasar que las empresas lideradas por hombres. El liderazgo femenino reduce el riesgo de cese en un 42,57 %. El efecto es estadísticamente significativo al 1 % ($p < 0,01$). Por otro lado, un mayor financiamiento público también disminuye el riesgo de fracaso. Cada punto porcentual de financiamiento disminuye el riesgo en un 40,93 % ($p < 0,001$). Estos resultados fueron obtenidos mediante modelos de riesgos proporcionales de Cox y constituyen evidencia robusta de que el género del liderazgo y la asignación de recursos financieros se vinculan de manera significativa con la supervivencia empresarial en sectores de alto crecimiento. Además, en el octavo año, la supervivencia observada alcanza un 49,2% en empresas lideradas por mujeres frente a 31,4% en aquellas lideradas por hombres. Este resultado cuestiona la tesis convencional de la hipótesis del bajo desempeño femenino y sugiere que, cuando existen apoyos institucionales relativamente estructurados, el liderazgo femenino puede traducirse en trayectorias de mayor estabilidad y permanencia.

El segundo estudio examina el sector cleantech, un sector más exigente por su intensidad de capital, complejidad tecnológica y dependencia regulatoria. Se consideró una muestra de 185 emprendimientos chilenos pertenecientes a este sector.

El análisis de supervivencia con fracción de cura mostró un patrón distinto al del estudio anterior. Las empresas lideradas por mujeres evidenciaron una menor tasa de supervivencia, presentando una razón de riesgo de 1,62. ($p < 0,001$), lo que implica que, las empresas lideradas por mujeres en el grupo susceptible tienen un riesgo de cesar operaciones que es 62 % mayor que el riesgo de las empresas lideradas por hombres, y donde se controlaron todas las demás variables. Asimismo, se observa que un mayor monto de financiamiento se asocia con una reducción del riesgo de cese en la fracción susceptible (HR

= 0,78, $p < 0,05$), mientras que un menor nivel educacional incrementa significativamente la vulnerabilidad empresarial. En particular, la educación secundaria o técnica del líder. se relaciona con un mayor riesgo de cierre (HR = 2,05, $p < 0,001$). El mismo estudio identifica que aproximadamente el 30% de las empresas podría clasificarse como parte de una fracción resiliente o de muy baja probabilidad de cierre en el largo plazo. Este resultado refuerza la idea de que el riesgo no es homogéneo entre emprendimientos, sino dependientes del contexto sectorial y de la configuración de recursos disponibles.

Lo que hace particularmente interesante este segundo estudio, es la incorporación del capital psicológico como dimensión explicativa complementaria (Luthans et al., 2007; Martínez Gregorio, 2023). En el estudio cleantech, la evaluación cuasi-experimental del programa de aceleración, que se llevó a cabo mediante la aplicación de una encuesta estructurada en dos momentos (pretest y postest) a una muestra de 21 emprendedoras, con el propósito de medir los cambios asociados a la intervención. Demostró mejoras estadísticamente significativas en habilidades emprendedoras y autoconfianza entre las participantes. Las habilidades emprendedoras aumentaron de 3,50 a 4,20 y la autoconfianza de 3,70 a 4,50, en los dos casos $p < 0,001$. Los resultados muestran que la intervención no solo entrega contenidos o acceso a redes, sino que fortalece recursos psicológicos que pueden incidir en la persistencia, en la toma de decisiones y en la capacidad de enfrentar incertidumbre, rechazo y sesgos en contextos altamente masculinizados.

Esta dimensión permite conectar recursos con capacidades individuales, integrando la RBV con literatura de capital psicológico y capacidades dinámicas (Collins, 2020; Engelmann, 2023).

Los resultados confirman y amplían la teoría de los recursos (RBV), demostrando que la supervivencia de nuevas empresas no depende únicamente de los recursos que posee, sino también de la posibilidad de acceder a ellos, combinarlos y convertirlos en capacidades organizacionales sostenibles. En ambos estudios, el financiamiento público aparece como un recurso estratégico con más de una dimensión, ya que no solo aporta liquidez inicial a la empresa, sino que también constituye una señal de legitimidad, un mecanismo de validación en el ecosistema de emprendimiento y el acceso a redes, mentorías y servicios especializados provistos por incubadoras y aceleradoras. Por tanto, el financiamiento público debe entenderse como un “paquete de recursos” tangibles e intangibles que contribuye a reducir

la liability of newness y a fortalecer la capacidad de permanencia de los emprendimientos.

La tesis también muestra que el acceso a recursos públicos no produce efectos uniformes. En el primer estudio, el liderazgo femenino está ligado a mejores resultados de supervivencia. Esto sugiere que, bajo ciertas condiciones institucionales, las mujeres logran transformar el capital humano, el capital social y los recursos financieros que reciben en trayectorias empresariales más estables. Este hallazgo, demuestra y es consistente con una interpretación que cuestiona la hipótesis tradicional de bajo rendimiento femenino y sugiere que, cuando existen mecanismos de apoyo relativamente estructurados, las empresas lideradas por mujeres pueden exhibir estrategias más prudentes una mayor disciplina en la asignación de recursos y una orientación más marcada hacia la sostenilidad organizacional en el mediano plazo (Jennings & Brush, 2013; Kanze et al., 2017).

No obstante, el segundo estudio introduce un punto relevante: dicha ventaja no se puede aplicar a todos los sectores productivos. La ventaja no puede generalizarse en todo los sectores. En el sector cleantech, la supervivencia empresarial está condicionada por una combinación más compleja de capital financiero, conocimiento técnico, redes de alto nivel y legitimidad sectorial. En este entorno, las brechas de género aparecen más visibles particularmente en el subconjunto de empresas susceptibles al cierre. El liderazgo de mujeres incrementa el riesgo de cese en ese segmento, lo que indica que las emprendedoras no enfrentan únicamente barreras de entrada, sino también restricciones persistentes para consolidar trayectorias de crecimiento y resistencia en industrias donde el capital intensivo y las redes especializadas son decisivas.

En esta línea, el análisis de clúster aporta evidencia que el ecosistema cleantech no es homogéneo. Se identificaron tres perfiles diferentes: un clúster de emprendedores jóvenes, sin experiencia laboral o experiencia emprendedora previa, cuentan con educación de pregrado y presentan una tasa de supervivencia del 51%. Luego, un clúster con mayor acceso a financiamiento, que registra la mayor tasa de supervivencia; y finalmente un clúster de alta experiencia, pero menor supervivencia, asociado a limitaciones de capital social y financiero. El clúster con mayor financiamiento y concentración principal en la Región Metropolitana alcanzó la tasa de supervivencia más alta de 67%, mientras que el grupo más vulnerable presentó una supervivencia de 39%.

La evidencia presentada muestra que las desigualdades de género en la supervivencia

empresarial no se pueden explicar solo con las características individuales del fundador, sugiriendo mecanismos más profundos. En primer lugar, existe una desigual distribución del capital financiero. Las mujeres reciben menos financiamiento en el estudio de startups de crecimiento, y también enfrentan mayores restricciones en contextos sectoriales intensivos en capital como el sector cleantech. En segundo lugar, la desigualdad en la disponibilidad del capital social afecta a la empresa, entendida como el acceso a redes, contactos estratégicos y las formas de legitimación. En tercer lugar, el capital humano y la experiencia previa protegen la supervivencia del negocio. Eso indica que los entornos donde las mujeres han tenido menos acceso a ciertas trayectorias profesionales y empresariales también crean desventajas en la etapa de consolidación del negocio.

Mecanismos que explican las diferencias de supervivencia según el género

La evidencia de la tesis presenta al menos cinco mecanismos que explican las diferencias en la supervivencia de las empresas según el género. El primero corresponde al acceso diferencial a recursos estratégicos. En ambos estudios, el financiamiento y la experiencia emprendedora reducen el riesgo de cierre, lo que confirma que la disponibilidad de recursos valiosos condiciona la permanencia en el mercado. El segundo mecanismo es el rol de la política pública, que puede compensar en parte las desventajas iniciales cuando combina financiamiento con acompañamiento, redes y validación institucional. El tercero es la heterogeneidad entre sectores: el efecto del género cambia según la intensidad de capital, la complejidad tecnológica y el tipo de legitimidad requerida por el sector. El cuarto mecanismo es la configuración del ecosistema de recursos, observable especialmente en el sector cleantech, donde no todas las empresas enfrentan las mismas condiciones de permanencia. El quinto y último mecanismo, es el fortalecimiento del capital psicológico, que opera como recurso mediador entre apoyo institucional y comportamiento emprendedor.

En conjunto, estos mecanismos indican que las diferentes trayectorias de supervivencia no son el resultado de una "ventaja" o "desventaja" femenina esencial, sino de la interacción entre género, estructura de recursos, diseño institucional y condiciones del mercado. Esta interpretación resulta especialmente relevante para las economías emergentes donde las fallas de mercado, la dependencia de apoyos del Estado y las redes que no son formales, hacen más visible el peso de las desigualdades.

La discusión integrada permite extraer varias implicancias y aprendizajes que aportan a distintas audiencias. En el ámbito académico, la tesis demuestra que el género se debe analizar como una dimensión relacionada con otras dimensiones y no solo como una variable demográfica. Asimismo, muestra que los estudios de supervivencia empresarial ganan poder explicativo cuando incorporan heterogeneidad no observable, segmentación de perfiles y mecanismos psicosociales. En el plano metodológico, la combinación de modelos de Cox, modelos con fracción de cura, análisis de clúster y evaluación cuasi-experimental constituye una estrategia robusta para estudiar supervivencia en emprendimientos de economías emergentes.

En el ámbito de la política pública, los resultados sugieren que no basta con ampliar el acceso al financiamiento. Es necesario diseñar instrumentos diferenciados según etapa, sector y perfil de recursos del emprendimiento. En los sectores de alto crecimiento en general, el financiamiento público muestra un fuerte apoyo y puede contribuir a sostener trayectorias lideradas por mujeres. En el sector cleantech, los emprendedores necesitan apoyos más complejos, que integren financiamiento suficiente, mentoría especializada, acceso a redes técnicas y comerciales, y el fortalecimiento del capital psicológico. En otras palabras, la evidencia indica que las políticas efectivas para reducir brechas de género deben ser integrales, sectorialmente sensibles y explícitamente orientadas a remover barreras que existen en múltiples dimensiones.

En resumen, los resultados de esta tesis indican que la supervivencia de las empresas en economías emergentes depende de la interacción entre género, recursos estratégicos, política pública y contexto sectorial. El primer estudio evidencia que, en startups de alto crecimiento apoyadas por instrumentos públicos, las empresas lideradas por mujeres presentan una menor probabilidad de fracaso y que el financiamiento público reduce significativamente el riesgo de salida. El segundo estudio muestra que en el sector cleantech las dinámicas son diferentes: allí, las mujeres enfrentan mayor vulnerabilidad en el segmento susceptible al fracaso, especialmente cuando concurren restricciones de capital financiero, social y humano, aunque intervenciones como las Comunidades de Práctica muestran capacidad para fortalecer recursos psicológicos y emprendedores. Por eso, la tesis permite pasar desde una descripción de brechas hacia una explicación de los mecanismos que las producen, ofreciendo una interpretación integrada y empíricamente fundada de la

supervivencia empresarial con perspectiva de género.

Los dos estudios, en su conjunto, permiten transitar de una descripción de las brechas de supervivencia a un modelo explicativo que articula diversos tipos de recursos, configuraciones sectoriales y mecanismos psicosociales. La contribución global de la tesis radica en demostrar que las desigualdades de género en la supervivencia empresarial no responden únicamente a características individuales del fundador, sino a configuraciones de recursos y a la interacción entre política pública, sector productivo y capital psicológico. Este enfoque integrado ofrece implicancias relevantes para el diseño de políticas diferenciadas y basadas en evidencia, orientadas a construir ecosistemas emprendedores más resilientes y equitativos en economías emergentes.

Organización general de tesis

La presente tesis se organiza de la siguiente manera. El Capítulo 2 presenta el primer artículo científico, publicado en la revista Management Research: The Journal of the Iberoamerican Academy of Management, titulado "Female Leadership in Startups: Analyzing Survival Rates and Challenges in Emerging Economies", junto con sus principales contribuciones. El Capítulo 3 expone el segundo artículo científico, actualmente enviado a la revista International Journal of Gender and Entrepreneurship, titulado "Survival, Resilience, and Entrepreneurial Capital in Women's Cleantech Ventures in Emerging Economies".

El Capítulo 4 desarrolla una discusión integrada de los principales resultados de ambos artículos, con énfasis en el análisis de supervivencia empresarial y en los aspectos de gestión estratégica, articulando la evidencia empírica obtenida. Finalmente, el Capítulo 5 presenta las conclusiones generales de la tesis, así como sus principales limitaciones.

Artículos científicos y otros proyectos adjudicados

- **Artículo publicado:**

Millán, B., Kuschel, K., Bustamante, C., Carrasco, J. A., & Catalán, P. (2026). Female leadership in startups: Analyzing survival rates and challenges in emerging economies. *Management Research: The Journal of the Iberoamerican Academy of Management.* https://doi.org/10.1108/MRJIAM-06-2025-1744

- **Artículo enviado:**

Millán Jara, B., Kuschel Rietzsch, K., Bustamante Viveros, C., Carrasco Montagna J. (2026). Survival, Resilience, and Entrepreneurial Capital in Women's Cleantech Ventures in Emerging Economies. En consideración para el special issue "Extending the Boundaries of Women's Entrepreneurship". *International Journal of Gender and Entrepreneurship.*

- **Proyectos adjudicados:**

Para el desarrollo de esta investigación, se obtuvo financiamiento nacional e internacional que se describen a continuación:

1. Beca de Postgrado para participar en congreso y presentación de paper: SEE2023 - 10th Sustainability, Ethics & Estrepreneurship (SEEi) Conference and Consortium, desde 03/03/2023 hasta 04/03/2023 en San Juan, Puerto Rico, USA. Título Trabajo: A Gender Perspective for the Survival of Ventures.
2. Financiamiento de Fundación Luksic, para desarrollar el artículo "Female Leadership in Startups: Analyzing Survival Rates and Challenges in Emerging Economies." Este financiamiento permitió realizar la pasantía internacional en el KIT, Karlsruhe Institute of Technology, Alemania en 2023.
3. "Fueling the Change: Creating a Community of Practice for Stimulating Entrepreneurship and Innovation of Women in Cleantech"

   Aspen Network of Development Entrepreneurs (ANDE), un programa de Aspen Institute, con el apoyo del International Development Research Centre (IDRC), aprobó una subvención para la Universidad de Concepción, específicamente para IncubaUdeC, su Plataforma de Apoyo al Emprendimiento, donde fui la directora de proyecto y trabaj con la investigadora Katherina Kuschel. Tras recibir más de cincuenta propuestas elegibles de África Subsahariana, América Latina y el Caribe, el proyecto financió seis investigaciones sobre mujeres en el sector de energía limpia, siendo el único aprobado en Chile. Fecha del proyecto: enero 2025 a marzo 2026. Este proyecto generó los insumos para el segundo artículo, a través de la creación y ejecución de un programa de aceleración y una Comunidad de Práctica.

- **Presentaciones en Conferencias**

Millán, B., Kuschel, K., Bustamante, C., Carrasco, J.C., & Catalán, P. (2025). Female leadership in startups: Analyzing survival rates and challenges in emerging economies. Communication to be presented at Chile Strategy Conference. Santiago, Chile. December 17-19, 2025.

Kuschel, K. & Millán, B. (2025). Fueling the Change: Creating a Community of Practice for Stimulating Entrepreneurship and Innovation of Women in Clean Energies. Communication presented at BALAS. San José, Costa Rica - April 8-11, 2025.

Millán, B., Kuschel, K., Bustamante, C., Carrasco, J.C., & Catalán, P. (2023). A gender perspective on the survival of ventures. Communication presented at the 10th Sustainability, Ethics & Entrepreneurship (SEE) Conference and Consortium 2023. San Juan, Puerto Rico, USA. March 3-5, 2023.

CAPÍTULO 2

Female Leadership in Startups: Analyzing Survival Rates and Challenges in Emerging Economies

Este capítulo incorpora el manuscrito correspondiente al artículo publicado. A continuación, se presenta la versión aceptada por los autores después del proceso de revisión por pares, la cual no corresponde a la versión final diagramada ni al diseño editorial de la revista.

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FEMALE LEADERSHIP IN STARTUPS: ANALYZING SURVIVAL RATES AND CHALLENGES IN EMERGING ECONOMIES

LIDERAZGO FEMENINO EN LAS EMPRESAS EMERGENTES: ANALIZANDO TASAS DE SUPERVIVENCIA Y RETOS EN ECONOMÍAS EMERGENTES

LIDERANÇA FEMININA EM STARTUPS: ANALISANDO TAXAS DE SOBREVIVÊNCIA E DESAFIOS EM ECONOMIAS EMERGENTES

Abstract

Purpose: We studied how leadership, gender and funding work together as key factors in startups' survival, explaining performance differences among high-growth firms. We focus on the important role of female leadership and financial resource allocation in helping businesses last longer in emerging markets, in a Latin American context.

Design/methodology/approach: We use a longitudinal analysis of 888 startups supported by government subsidies over eight years. We applied Cox proportional hazards models to measure how gender and funding affect startups' chances of survival.

Findings: Results show that startups led by women have significantly higher survival rates than those led by men, with a 42.57% lower risk of failure. Also, every 1% increase in funding is linked to a 40.93% drop in failure risk. Our findings show the combined advantage of female leadership together with strong financial support.

Originality/value: Our research adds to the strategic management literature by offering evidence of the positive effects of gender diversity in leadership and financial resources on startups survival. Building on earlier studies we add a focus on emerging economies, and calculate how much of an advantage women-led firms have.

Practical implications: The results of our study can help policymakers, investors, and entrepreneurship support organizations developing strategies to encourage inclusive leadership and improve funding methods that can impact firm stability and growth.

Social implications: By highlighting the higher performance of women-led startups, this study supports the value of gender equality in entrepreneurship and shows the wider benefits of having diverse leadership in business communities.

Keywords: Startups, female entrepreneurship, business survival, gender and innovation, emerging economies, strategic management

Paper type: Research paper.

Resumen

Objetivo: Estudiamos cómo el liderazgo, el género y el nivel de financiación interactúan como factores clave en la supervivencia de las empresas emergentes, con el fin de explicar las diferencias de rendimiento entre las empresas de alto crecimiento. Nos centramos en el importante papel que desempeñan el liderazgo femenino y la asignación de recursos financieros para ayudar a las empresas a perdurar en los mercados emergentes, en el contexto latinoamericano.

Diseño/metodología/enfoque: Utilizamos un análisis longitudinal de 888 empresas emergentes apoyadas por un programa de subvenciones gubernamentales durante ocho años, aplicando modelos de riesgos proporcionales de Cox para medir cómo el género y los niveles de financiación afectan a las posibilidades de supervivencia de una empresa.

Resultados: Los resultados muestran que las empresas emergentes dirigidas por mujeres tienen tasas de supervivencia significativamente más altas que las dirigidas por hombres, con un riesgo de fracaso un 42,57 % menor. Además, cada aumento del 1 % en la financiación se asocia con una reducción del 40,93 % en el riesgo de fracaso. Nuestros resultados muestran la ventaja combinada del liderazgo femenino junto con un fuerte apoyo financiero.

Originalidad/valor: Nuestra investigación se suma a la literatura sobre gestión estratégica al ofrecer pruebas de los efectos positivos de la diversidad de género en el liderazgo y los recursos financieros en la supervivencia de las empresas emergentes. Centrándonos en las economías emergentes, calculamos la ventaja que tienen las empresas dirigidas por mujeres, basándonos en estudios anteriores.

Implicaciones prácticas: Los resultados de nuestro estudio pueden ayudar a los responsables políticos, los inversores y los grupos de apoyo al emprendimiento a desarrollar estrategias para fomentar el liderazgo inclusivo y mejorar los métodos de financiación que pueden influir en la estabilidad y el crecimiento de las empresas.

Implicaciones sociales: Al destacar la fortaleza de las empresas emergentes dirigidas por mujeres, este estudio respalda el valor de la igualdad de género en el emprendimiento y muestra los beneficios más amplios de contar con un liderazgo diverso en las comunidades empresariales.

Palabras clave: Startups, emprendimiento femenino, supervivencia empresarial, género e innovación, economías emergentes, gestión estratégica

Resumo

Objetivo: Estudamos como liderança, género e nível de financiamento atuam em conjunto como fatores-chave na sobrevivência de startups, com o objetivo de explicar as diferenças de desempenho entre empresas de alto crescimento. Focamos no importante papel da liderança feminina e da alocação de recursos financeiros para ajudar as empresas a durarem mais tempo nos mercados emergentes, no contexto latino-americano.

Design/metodologia/abordagem: Utilizamos uma análise longitudinal de 888 startups apoiadas por um programa de subsídios governamentais ao longo de oito anos, aplicando modelos de riscos proporcionais de Cox para medir como o género e os níveis de financiamento afetam as chances de sobrevivência de uma empresa.

Resultados: Os resultados mostram que as startups lideradas por mulheres têm taxas de sobrevivência significativamente mais altas do que as lideradas por homens, com um risco 42,57% menor de falência. Além disso, cada aumento de 1% no financiamento está associado a uma queda de 40,93% no risco de falência. Nossas descobertas mostram a vantagem combinada da liderança feminina com um forte apoio financeiro.

Originalidade/valor: A nossa investigação contribui para a literatura sobre gestão estratégica, oferecendo evidências dos efeitos positivos da diversidade de género na liderança e dos recursos financeiros na sobrevivência das startups. Com foco nas economias emergentes, calculamos a vantagem das empresas lideradas por mulheres, com base em estudos anteriores.

Implicações práticas: Os resultados do nosso estudo podem ajudar os decisores políticos, investidores e grupos de apoio ao empreendedorismo a desenvolver estratégias para incentivar a liderança inclusiva e melhorar os métodos de financiamento que podem impactar a estabilidade e o crescimento das empresas.

Implicações sociais: Ao destacar a força das startups lideradas por mulheres, este estudo reforça o valor da igualdade de género no empreendedorismo e mostra os benefícios mais amplos de ter uma liderança diversificada nas comunidades empresariais.

Palavras-chave: Startups, empreendedorismo feminino, sobrevivência empresarial, gênero e inovação, economias emergentes, gestão estratégica

1. INTRODUCTION

Startup survival is a concept in entrepreneurship and management research. For new ventures, survival serves as a proxy for performance and success (Josefy et al., 2017; Mudambi & Zahra, 2007; Soto-Simeone et al., 2020; Bustamante, Matusik & Benavente, 2021). Studies show that approximately 50% of new ventures survive more than five years (Aldrich & Ruef, 2006; U.S. Bureau of Labor Statistics, 2024), and only 10% more than ten years (Timmons, 1990). Hence, explaining survival and finding ways to improve its odds become an angular question among entrepreneurship and strategy scholars (Bruderl et al., 1992; Shane & Foo, 1999; Gimmon & Levie, 2010; Yang & Aldrich, 2012; Soto-Simeone et al., 2020).

In his seminal article, Stinchcombe (1965) argued that young firms have a high propensity to fail because their members cannot adapt quickly enough to new roles and business relationships. This phenomenon, known as the "liability of newness", has played a fundamental role in the debate on the emergence of new businesses and their survival prospects, as new firms lack access to resources (Headd, 2003), specific skills, and established relationships that enhance legitimacy and structural support in the market (Guerrazzi et al., 2022), compared to established organizations. Subsequent work distinguishes between initial founding conditions and post-founding activities in explaining failure and survival in organizations (Yang & Aldrich, 2017). High growth ventures in particular face significant challenges related to survival, because rapid scaling strains cash-flow and coordination before routines stabilize; consistent with recent evidence that very fast growers do not enjoy the highest survival rates (Lee & Kim, 2024). For the purpose of this study, we define high growth ventures as firms with ex-ante potential for scalability, innovation, and rapid job creation, selected through competitive government programs that assess growth trajectories based on market opportunity, team expertise, and technological differentiation (Kuschel et al., 2020; Kuschel & Lepeley, 2016; OECD, 2010).

The survival literature has explored the role of gender as a founding condition influencing access to critical resources, especially in the realm of high-growth startups. Recent studies enhance the importance of gender in entrepreneurship (Kakeesh, 2024; Brush & Elam, 2023). Women-led firms exhibit lower levels in most proxies of performance: survival rates, profits, employment (firm size), and sales (Kiefer et al., 2020). This can be

explained due to systemic barriers such as limited access to funding and mentorship (Bullough, 2023). Studies in high-income economies reveal that women-led startups face significant challenges explained by gender (Fairlie & Robb, 2009; Du Rietz & Henrekson, 2000; Rosa et al., 1996). These disparities can be more salient outside high-income contexts. While they represent half of the world's GDP (Moris, 2023), emerging country environments are still underexplored (Dencker et al., 2021).

The Latin American setting is therefore informative. Chile pioneered subsidy-based policies and large-scale support through incubators and accelerators to mitigate capability restrictions for high growth potential startups, becoming a reference for the region (Applegate et al., 2012; Bustamante et al., 2021; González-Uribe & Reyes, 2021; González-Uribe & Leatherbee, 2018). Aiming to advance this conversation, this study evaluates an eight year panel of 888 high-growth startups that received government funding and support from incubators and accelerators in Chile. Our findings show that women-led firms, which represent 11.2% of businesses in Chile (Ministerio de Ciencia, Tecnología, Conocimiento e Innovación, 2021), have higher survival probabilities than male-led firms. These results hold even when controlling for educational level. In addition, we examine how public funding relates to survival.

This research advocates for the implementation of policies that address funding disparities and resource allocation. By framing the discussion around gender in startups, this study contributes to a more comprehensive understanding of how supporting women entrepreneurs can not only enhance strategic outcomes for individual firms but also catalyze broader economic development, innovation, and social equity on a global scale (Faugoo, 2024). Specifically, we aim to answer the following questions

RQ1: To what extent does female entrepreneurship shape the survival of high-growth startups?

RQ2: How does public funding shape survival of startups, and what is the magnitude of its protective effect against failure risk?

The document is structured as follows: Section 2 reviews the literature on new business survival, gender, and public subsidies; Section 3 presents the methods and data; Section 4

introduces our results, and Section 5 summarizes our main implications, conclusions, limitations, and directions for future research.

LITERATURE REVIEW, THEORETICAL BACKGROUND, AND HYPOTHESES

New Venture Survival and the Resource-Based View

Research on startup survival is a topic of increasing interest in the entrepreneurship literature, reflecting the critical role that new ventures play in encouraging innovation and economic growth (Adjei, 2021; Bustamante et al., 2021), with different theoretical conceptions evolving over time. In particular, we focus on the Resource-Based View (RBV) (Wernerfelt, 1984; Barney, 1991) as an adaptationist approach that suggests that a firm's internal and external resources significantly influence its performance (Barney, 1991). RBV emphasizes that successful startups are not only defined by their innovative ideas but also by their strategic management and access to resources.

The Resource-Based View provides a robust theoretical framework for understanding why some startups succeed while others fail, particularly in contexts of resource scarcity. At its core, RBV posits that sustainable competitive advantages derive from resources that are Valuable, Rare, Inimitable, and Organizationally exploited (VRIO) (Lubis, 2022). These resources can be tangible (financial capital, physical assets) or intangible (knowledge, networks, capabilities), with the latter often proving more critical for long-term survival. The VRIO framework offers an analytical lens through which we can assess how various characteristics of startup leaders, including gender, contribute to the configuration and deployment of strategic resources (Lubis, 2022; Adam et al., 2022).In his seminal work on the liability of newness, Stinchcombe (1965) proposed antecedents to explain the survival prospects of new firms, emphasizing the importance of diverse resources and capabilities that allow startups to navigate the inherent risks of their initial stages (Schoonhoven & Eisenhardt, 1990). Building on this foundation, Barney (1986) demonstrated that “strategic factor markets will be imperfectly competitive when different firms have different expectations about the future value of a strategic resource” (1986: 1231). Consequently, RBV theory highlights how information asymmetries in resource markets can impact the strategic choices available to startups, complicating their path to competitive success.

Recent advancements in RBV theory have expanded its application to entrepreneurial

contexts and demographic diversity. Adam et al. (2022) demonstrate how women entrepreneurs mobilize specific resource configurations to achieve business sustainability. They identify three critical resource categories particularly relevant to female entrepreneurship: human capital (skills, experience, education), social capital (networks, relationships, trust), and financial literacy. This theoretical extension is especially pertinent to our study, as it establishes a direct conceptual link between gender-specific resource orchestration and business survival outcomes. Furthermore, Khan et al. (2023) provide validation that gender diversity itself constitutes a strategic resource at the leadership level, contributing to enhanced decision-making processes and ultimately impacting firm performance positively in emerging market contexts.

Various factors influence the survival of startups. Both the novelty and adolescence perspectives suggest that a firm's early years are the riskiest. Many new startups do not survive their first years, burdening themselves, their investors, and the economy (Headd, 2003; Wiklund et al., 2010). A recent literature review of 205 studies exploring business survival classified its drivers into three main categories (Soto-Simeone et al., 2020). The first category corresponds to conditions that characterize the environment, such as institutions, markets, competition (Carroll & Huo, 1986; Müller & Bergmann, 2022), and the effects of the economic cycle (Ejermo & Xiao, 2014). Regional characteristics, such as the type of region, employment rate, and market access, also influence the survival of new firms (Fritsch et al., 2006). Institutional distance is also relevant, especially for firms in the internationalization stage (Bustamante et al., 2020). The second category relates to assets, structural characteristics, and strategies of new firms, such as financial resources, innovation, and internationalization (Díaz-Santa María & Bulchand-Gidumal, 2021; Fariborzi & Keyhani, 2018; Joardar & Wu, 2017; Gurdon & Samsom, 2010; Cooper et al., 1994; Christensen, 1997; Lin et al., 2010). The third and final category corresponds to the individual characteristics of founders and teams, such as general and specific human capital, previous experience, networking, and the gender diversity of the founding team, which affect the survival of new firms (Simón-Moya & Revuelto-Taboada, 2016; Konno, 2021; Brüderl et al., 1992; Wilson et al., 2014). Sociodemographic characteristics, such as gender and ethnicity, are factors that are increasingly considered in other studies (Boden & Nucci, 2000; Klapper & Parker, 2010; Freeland & Keister, 2016; Jiang et al., 2016).

It is noteworthy that the value and deployment of resources may differ significantly across contexts, particularly when comparing high-income economies with emerging markets. Sharma and Dahlstrand (2023) highlight that innovation and survival in the "Global South" often depend on resources that traditional RBV frameworks might undervalue—tacit knowledge, social networks, and frugal resource management. Their analysis of innovations in informal contexts suggests that women entrepreneurs in Latin American economies may leverage distinct resource configurations compared to their counterparts in high-income economies. This contextual dimension of RBV is essential for our study, as it helps explain why gender-related resource advantages might manifest differently in Chile compared to findings from studies conducted in other economic contexts.

From an RBV perspective, public funding can be conceptualized as more than a simple financial resource; it functions as a bundle of strategic assets. Beyond providing liquidity, public subsidies offer legitimacy signals that reduce information asymmetries (certifying the venture's quality to stakeholders), open access to networks and complementary services (mentoring, training), and enable the acquisition of other critical resources. For women entrepreneurs, who often face greater barriers in accessing traditional financing, such public support may be particularly valuable in transforming their human and social capital into sustainable competitive advantages (Adam et al., 2022; Sharma & Dahlstrand, 2023)

This nuanced understanding of how various factors contribute to the survival of startups underscores the necessity for strategic management practices that are sensitive to these dynamics, positioning gender as a pivotal aspect of entrepreneurial success and innovation in global markets (Idris, 2024).

Founder´s gender and new venture's survival

The characteristics of the founder represent a consistently identified category of factors affecting startup survival (Hejazi et al., 2024). Within this domain, founder's gender has emerged as a key explanatory variable, with significant attention in the entrepreneurship literature. A recent systematic literature review confirms that gender is a fundamental individual-level factor that influences survival outcomes, especially through its interaction with organizational resources and ecosystem characteristics (Hejazi et al., 2024).

Research in entrepreneurship has indicated that women-led ventures are generally less

successful than are those led by men in terms of sales, employment growth, survival, and profitability (Kiefer et al., 2020; Yang & del Carmen Triana, 2019; Amoroso & Link, 2017; Boden & Nucci, 2000). This observation has been conceptualized as the "female underperformance hypothesis," which attributes these differences to several limiting factors, such as a lower growth orientation, gaps in capital raising, low levels of operational resources and target margins (Cantet et al., 2024; Guzman & Kacperczyk, 2019; Fairlie & Robb, 2009). Furthermore, women entrepreneurs often encounter structural disadvantages within entrepreneurship ecosystems, particularly in traditional sectors characterized by low growth potential (Guzmán et al., 2019; Brush et al., 2019), which is not much different from the situation twenty-four years ago (Alexandra et al., 2000).

Recent research, however, has begun to recontextualize this apparent underperformance. Sandberg (2025) argues that the dominant startup culture operates as a "masculinity contest," characterized by extreme competition, valorization of overwork, and suppression of emotions—a culture that is inherently exclusionary toward women and non-conforming men. This perspective suggests that what appears as "underperformance" may actually represent women's rational rejection of toxic cultural norms in favor of building more sustainable organizational environments. Indeed, the hypercompetitive "growth at all costs" approach typical in mainstream startup ecosystems may actually increase failure risk through team burnout, financial overextension, and strategic tunnel vision—precisely the factors identified as key drivers of startup failure (Bethlendi et al., 2025).

However, recent research has challenged this hypothesis by finding no significant differences in business performance between genders. For example, Farhat and Mijid (2018), using a matched-pairs approach, reported no significant gender differences in terms of survival, profitability, growth, or financial capital. Additionally, other studies have suggested that teams with an equal gender mix may perform better in sales and performance (Hoogendoorn et al., 2013).

Moreover, emerging evidence suggests that women entrepreneurs may adopt fundamentally different strategic approaches to building successful ventures. Mets and Vettik-Leemet (2024) demonstrate how women in male-dominated ecosystems carve out strategic niches—particularly in sectors like sustainability—where they leverage their human and social capital to build competitive advantages away from the hypercompetitive

mainstream. This strategy of differentiation enables survival through resilience and stability rather than explosive growth. Such approaches align well with findings on startup failure causation, which identify team conflict, poor financial management, and inadequate product-market fit as primary failure drivers (Bethlendi et al., 2025). If women leaders tend toward more collaborative team environments, prudent financial strategies, and customer-centric product development—as some literature suggests—they may systematically mitigate the very risks most associated with venture failure.

Research shows that when work experience and education are similar between women and men, no significant gender differences are found in the survival of their ventures (Brush et al., 2017; Greene et al., 2003). Moreover, when motivational elements are defined, women with a higher risk propensity and less attention to work–life balance have higher success rates (Rey-Martí et al., 2015), leading to gender stereotypes. These findings appear consistent across diverse geographic contexts, with research from emerging markets like Thailand confirming that founder characteristics, including gender, interact with resource access and strategic choices to determine survival outcomes (Kraivichien & Pruetipibultham, 2024).

These findings imply that, despite facing initial disadvantages, startups led by women can significantly improve their chances of survival when given equal opportunities and resources. Furthermore, the alternative leadership approaches and strategic choices that women entrepreneurs often employ—whether by preference or adaptation to hostile environments— may constitute advantages for long-term survival, particularly when structural barriers to resource access are removed through programs like public funding initiatives. Rather than succeeding despite their differences, women-led ventures may survive longer precisely because they build more sustainable cultures, adopt more prudent financial strategies, and focus more intently on validating product-market fit before aggressive scaling (Bethlendi et al., 2025; Sandberg, 2025; Mets & Vettik-Leemet, 2024). Consequently, this research underscores the importance of strategic management frameworks that strengthen gender inclusivity, suggesting that female-led startups may thrive under supportive entrepreneurial ecosystems. Therefore, we propose our first hypothesis:

Hypothesis (H1): High-growth ventures led by women are more likely to survive than those led by men.

Financial Resources, Government Support and New Venture Survival

Evidence suggests that startups require adequate financial resources at inception to mitigate the "liability of newness" and enhance their chances of survival (Stinchcombe, 1965). According to various authors, one alternative for obtaining this initial funding is through public subsidies, demonstrating a positive effect on business survival (Fuertes-Callén et al., 2024; Nakku et al., 2020; Stevenson et al., 2021; Srhoj et al., 2021)

However, subsidies do not necessarily always increase business survival rates. The review conducted by the OECD (2023) indicated that, although there is evidence that many public policies were effective, a smaller number of them did not show the same result. Similarly, Amezcua et al. (2013) concluded that resource munificence is not a universal predictor of survival in government-backed ventures.

The sponsorship of public resources, as defined by Jourdan and Kivleniece (2017, p.5), involves providing external resources to an organization by a public actor outside market exchange mechanisms, aiming to selectively influence the organization's emergence, survival, or performance. According to Stevenson et al. (2020), public subsidies hold greater efficacy during the initial stages of a startup's life cycle than during periods of growth, underscoring the importance of timely financial support for nascent firms.

Further studies indicate that approximately half of new organizations survive more than five years (Aldrich & Ruef, 2006), but there is evidence that public subsidies improve the likelihood of increasing entrepreneurial survival. New organizations face the challenge of gathering the necessary resources to survive in a competitive environment with limited and often biased knowledge (Cohen et al., 2019). In this context, financial resources can become a source of sustainable competitive advantage for new ventures, particularly high-growth potential startups that leverage these resources strategically.

In this study, "public funding" is not a generic term but refers to a specific, multi-faceted support mechanism designed by CORFO, Chile's economic development agency, for high-potential startups. The funding consists of non-repayable seed capital grants, distinguishing it from loans or tax incentives. These grants are awarded through competitive programs and mandate the compulsory participation of the startup in an incubator or accelerator. This integrated model means the support extends beyond mere financial liquidity; it functions as a strategic bundle of resources. Incubators and accelerators provide

essential non-financial assets such as business services, access to networks, and specialized knowledge, which are documented to increase the effectiveness of the financial resources provided.

This bundled support directly addresses the core tenets of "liability of newness". The non-repayable grant provides critical early-stage capital without the burden of debt, a significant factor in mitigating failure risk. Simultaneously, selection by a government agency acts as a powerful legitimacy signal, reducing information asymmetries and certifying the venture's quality to other stakeholders. This sponsorship enhances the venture's ability to acquire further resources and build the structural support needed for long-term viability. By providing both tangible financial capital and intangible resources, like mentorship and network access, this specific form of public support equips startups with a robust toolkit to build a sustainable competitive advantage. Therefore, we propose the following hypothesis

Hypothesis (H2):
Public funding significantly enhances the survival prospects of startups with high growth potential.

Additionally, various studies have explored the relationship between gender and financing. Kwapisz and Hechavarria (2018) reported that having a female founder significantly decreases the likelihood of obtaining funding. Additionally, multiple studies have highlighted the gender gap in entrepreneurship, showing that women-led ventures are less likely than men-led ventures to obtain external funding and, consequently, to survive due to gender stereotypes and the context of entrepreneurial ecosystems (Guzman & Kacperczyk, 2019; Brush et al., 2019; Kiefer et al., 2020; De Andrés et al., 2020; Jennings & Brush, 2013).

In this context, we also explore whether the interaction between financing and gender shapes the survival of high-growth potential ventures. Specifically, we propose the following third hypothesis:

Hypothesis (H3): The positive relationship between funding acquired and the survival of startups is strengthened when a woman leads the venture.

Through these hypotheses, this research aims to shed light on the significant role of financial resources and gender dynamics in shaping the survival prospects of startups, contributing to a more nuanced understanding of strategic management in emerging

entrepreneurial landscapes.

2. METHODS

Data and measures

Our analyses were performed via two sources of information: an entrepreneurs' survey developed by the government grant office (CORFO, the economic development agency in Chile), and data obtained from the Chilean Tax Administration (SII[1]). By compiling and merging these two databases, we obtained information for 888 new ventures awarded public funding between 2010 and 2021. The firms in our sample were born between 2010 and 2014, so the study comprises at least eight years of life for each firm. In cases where complete records of the firm's lifespan were not obtained, it has been interpreted as right censored to avoid assuming that these firms have experienced the event of non-survival. This approach was necessary due to the absence of tax records in the SII database for certain periods.

The selected programs for this study are specifically designed to promote the strength, creation, and launch of dynamic startups with high growth potential that exhibit innovative characteristics. This focus aligns with the increasing global emphasis on nurturing entrepreneurial ecosystems that support new ventures in diverse sectors.

The resulting database includes firm, individual, and localization variables. Firm-level variables include firm registration and closure year, economic sector, grant amount, sales, and finance program. Team leader characteristics and capabilities include gender, age, education, previous entrepreneurial experience, work experience, and geographic location. This compiled database was used to longitudinally analyze firm survival through the eighth year of life for a sample of high-growth startups created between 2010 and 2014.

The analysis of this database revealed that only 12.04% (107) of high-growth potential ventures were led by women. This percentage is consistent with data reported by the Ministry of Finance (2023), indicating that our sample is representative of the national population of high-growth startups led by women.

[1] The Chilean Internal Revenue Service is responsible for applying and administering the internal tax system, overseeing taxpayers' compliance with tax provisions, and facilitating such compliance. https://www.sii.cl/sobre_el_sii/acerca/estudios/resumen.htm

Regarding the public subsidy provided, public policy mandates the compulsory participation of an intermediary entity, which can be a public or private incubator or accelerator. This entity is responsible not only for delivering financing to the new company but also for providing an incubation or acceleration program, offering business services, networks, and access to knowledge, which increases the effectiveness of the resources provided (Li et al., 2020).

Dependent Variable: Survival

To analyze the survival of new ventures, we first need to define "new venture". While definitions vary (Reynolds & Curtin, 2008), the Global Entrepreneurship Monitor sets a threshold of 42 months, and other scholars extend it to five years (Hofer & Bygrave, 1992; Ireland & Webb, 2007; Almeida & Fernando, 2008; Cheng 2015; Ebert, Brenner & Brixy, 2019) or even eight years (Li and Zhang, 2007; Cader and Leatherman, 2011). Considering our dataset's wealth, we measure survival at year eight in this study. Based on the information collected in the database, the Survival variable was created, indicating whether a company survived the eight years since its creation. To determine this, we used the variable sales, and estimated that a firm had not survived in the last three years when it showed "no sales activity" or "tax information does not allow determining an estimated sales amount" during this period. Survival is a binary variable, defined by '1' if the company experienced the event of interest (the company is no longer operational), and '0' otherwise (the company remains operational). Additionally, the time that elapsed until the company experienced the event is considered: if this did not occur within the eight years of study, it is identified as right-censored.

This eight-year timeframe is particularly insightful as it allows the observation of ventures beyond their initial liability of newness, a period where failure rates are typically high (Soto-Simeone et al., 2020). Research indicates that the dynamics of survival evolve significantly as firms age (Eliakis et al., 2020). While many studies focus on the first five years, where failure rates can exceed 50%, analyzing a longer period captures critical transitions (Rannikko et al., 2018). An extended timeframe enables the examination of phenomena like the "liability of adolescence," where ventures face an increased risk of failure after an initial "honeymoon period" as they deplete their starting resources. It also allows for

the observation of ventures entering a stage of maturity, where new challenges and even a "liability of senescence"—rigidity hindering adaptability—can emerge, potentially increasing mortality rates again (Soto-Simeone et al., 2020). Empirical studies with longer observation windows confirm the value of this approach. For instance, Rannikko et al. (2018) tracked a cohort of new technology-based firms for eight years, revealing an unusually high survival rate of 72% but limited high-growth instances. Similarly, Eliakis et al. (2020), in a ten-year longitudinal study, identified distinct evolutionary stages, including an initial growth phase, a subsequent crisis, and a mature stage, demonstrating that survival is a dynamic process rather than a static outcome.

By extending our analysis to the eighth year, this study is better positioned to capture these complex, non-linear survival patterns and provide a more nuanced understanding of the long-term viability of new ventures, moving beyond the initial, albeit critical, first few years of existence.

Independent Variables

In analyzing the database, various independent variables. ' Gender ' is a dichotomous variable, represented by 1 if the company's leader (i.e., CEO) is a woman, and 0 otherwise. It captures the gender of the startup's primary leader. For the purposes of this study, the company's leader is defined as the individual with ultimate strategic and operational authority within the new venture: the Chief Executive Officer (CEO), the managing founder, or the person legally registered as the primary representative y. This focus is deliberate, as the leader acts as the central agent in resource acquisition and orchestration (RBV), strategic decision-making, and the shaping of organizational culture—all critical antecedents of survival identified in our theoretical framework (Hejazi et al., 2024; Sandberg, 2025).

The 'Funding' variable represents the amount of funding obtained through public grants to test previous findings that companies benefiting from larger grant sizes tend to have a higher survival rate (Carter et al., 1996; Parker & Belghitar, 2006). For this analysis, this continuous variable was transformed into the natural logarithm of the funding amount measured in millions of Chilean pesos (CLP).

Control Variables

The selection of control variables is grounded in extensive literature, identifying key antecedents of startup survival and success. These factors can be grouped into founder characteristics (human capital), firm characteristics, and environmental factors. The literature on human capital and entrepreneurship has consistently shown that founders' skills, knowledge, and experience are predictors of firm performance (Marvel, Davis, & Sproul, 2014; Unger, Rauch, Frese, & Rosenbusch, 2009). As such, the 'Education' variable represents the team leader's educational level, which is divided into three categories: high school/technical professional, undergraduate, and master's or doctoral (postgraduate). The variable 'Work Experience' is a continuous variable that represents the years of work experience of the leader. On the other hand, the leader's previous 'entrepreneurial experience' is a binary variable labeled with one if the company's leader has previously participated in other ventures and zero otherwise. Additionally, the variable 'Age' is a continuous variable that indicates the company leader's age when the grant is given to the venture.

In terms of firm-level and environmental factors, such as industry and geographical location, have been identified as significant influences on startup outcomes (Nosella, Forza, Workalemahu, & Molaro, 2025). The industry sector, for instance, imposes unique constraints and opportunities that influence strategy and business model design (Nosella et al., 2025). Studies often limit their analysis to specific sectors, such as ICT, to account for these differences (Bethlendi et al., 2025), making it necessary to control technology industry membership. Similarly, we used 'Tech Industry' as a binary variable identifying economic sector. A value of one means that the firm belongs to the sectors of science and technology ("mining and metallurgy," "biomedicine and biotechnology," and "information technologies"), and zero otherwise. In our database, 472 companies operate in sectors belonging to 'industry tech', accounting for 53.15% of the sample.

Similarly, geographical location can significantly affect survival, as regional ecosystems offer varying levels of access to resources, networks, and markets (Nosella et al., 2025). Research often controls differential macro-environmental impacts by limiting the geographical scope or including location as a control variable (Chandler & Jansen, 1992). In this paper, 'Geographical location' is a categorical variable that captures whether the new venture has been established in the North, Center or South of Chile. Location may shape the

odds of survival of a new company; previous research has shown that prosperous regions with greater endogenous capacities and higher economic performance improve the odds of survival and consequently attract the establishment of new enterprises (Dahl & Sorenson, 2009; Fritsch & Story, 2014). In this sense, northern and southern Chile may be disadvantaged compared with firms established in the central/metropolitan region. In fact, previous studies have shown that this region provides better access to financing, infrastructure, economic activity, and networks (Espinoza et al., 2019). Location disadvantages hinder higher levels of dynamic and innovative entrepreneurship in peripheral regions (Rydehell et al., 2018).

Finally, we had two control variables, accounting for temporal variations and policy interventions. Because companies have started their activities in different years, the categorical variable "Year" is defined as the period between the company starting its activities and the exit event. The economic and funding environment for startups can change drastically over time (Bethlendi et al., 2025), making it necessary to control for cohort effects. This definition guarantees that any significant effect of our variables captures the fixed effects associated with the natural variability of markets over time. Finally, the variable 'type of financing program', distinguished among the different government programs funding the startups in our database. Different public funding programs may offer varying levels of non-financial support, such as mentoring or network access (Bethlendi et al., 2025), making it essential to control the program type to isolate these effects. Our sample had startups belonging in five different programs, so we created a categorical control variable with five categories (Flexible Allocation Seed Subsidy Program, Seed Capital Profile, Seed Capital, Regional Entrepreneurship Support Program and Start-Up Chile). It is relevant to state that all these p rograms are aimed at high growth startups, their objective is to promote dynamic and innovative ventures in early stages that solve problems and aim to scale at national and global levels.

By examining these variables, this research aims to provide critical insights into the factors that influence the survival of startups, contributing to a deeper understanding of strategic management practices in emerging entrepreneurial ecosystems.

Statistical analysis

We used the Cox proportional hazards model, a widely used semiparametric model for survival data analysis. This method allowed us to assess the effects of independent variables through time on the survival of companies from the time of their inception. In assessing model robustness, the primary assumption that the Cox proportional hazards model must satisfy is that the risk of experiencing the event is constant over time. The proportional hazards function of the Cox model (Hosmer et al., 2008) can be described as follows:

$$h(t;x) = h_0(t) \cdot exp\left(\sum_{i=1}^{p} \beta_i X_i\right)$$
$$h(t;x) = h_0(t) \cdot exp(\beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_p x_p)$$

Here, h represents the risk individuals face at time t, given the independent and control variables Xp. Then, Bp represents the estimated coefficients for each Xp, indicating whether the risk increases or decreases for individuals according to the model.

The Schoenfeld residuals test was conducted for each model to assess whether this assumption was met (Therneau & Grambsch, 2000). As the variables satisfy this assumption individually and collectively, the proposed models adhere to the proportionality of hazards over time. Variable selection criteria were tested through manual inclusion and exclusion, their effects on estimations were examined, and the results remained consistent. As presented below, hazard ratios were estimated by bootstrapping to perform additional robustness tests. The analysis was performed using R software (version 4.2.3), which employs its survival library (Therneau, 2023) and boot library (Canty & Ripley, 2022).

3. RESULTS

Figure 1 shows the initial data analysis through a survival plot. We observe interesting differences when comparing the survival curves of companies led by men with those led by women. The results of the Kaplan–Meier curve estimations revealed that, by year eight, the survival rate of male-led companies was 31.4%. In contrast, companies led by women had a survival rate of 49.2% at the end of the period. These results suggest a possible effect of the leader's gender on the survival of newly established companies, suggesting that, on average, male leaders are more likely to be exposed to the event of not surviving.

These estimations, which also account for the right censoring in the data, indicate that

risk accumulation is more significant in male-led companies than in their female counterparts. Notably, the difference in accumulated risk becomes evident starting from year 5, which appears to be a critical period for newly established companies. This result may be associated with a company's planning and allocation of resources over time (Schoonhoven, 1990).

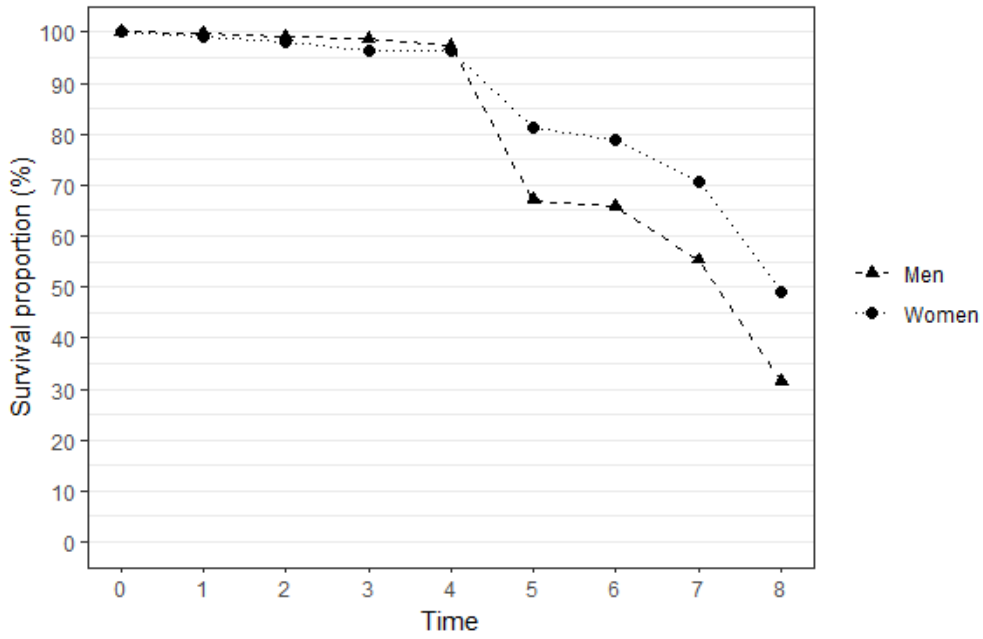

Fig. 1 Kaplan–Meier curves according to gender.

Source: Figure by authors.

Descriptive Statistics

Table I presents the correlations among the variables associated with company survival. No multicollinearity issues or high correlations are observed within the data, making Cox a suitable regression model. Some significant correlations include the negative relationship between the financing amount and survival, indicating higher survival as funding increases. We note that 'industry tech' shows a significant negative correlation with ‘gender’ ($r = -0.1285$, p value < 0.05), suggesting a small association between this type of venture and the male gender within the sample. Similarly, ‘funding’ and ‘work experience’ exhibit a small but significant positive correlation ($r = 0.119$, p value < 0.05), suggesting that people with previous work experience tend to be awarded greater public funding.

The funding received by male-led and female-led companies was compared via a

Mann–Whitney test (W = 48669, p value < 0.001), which revealed a statistically significant difference in funding for the two types of groups. The box plot for the difference in funding is shown in Figure 2, showing that female-led ventures receive less funding than their male counterparts.

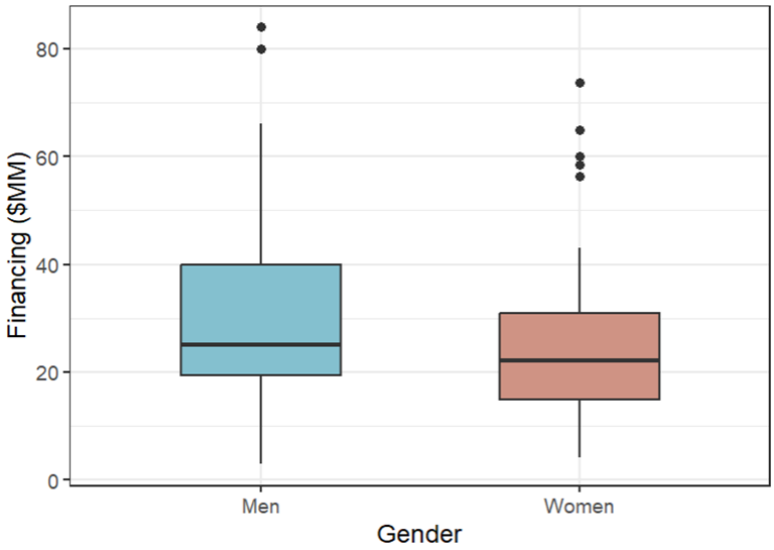

Fig. 2 Boxplot of funding distribution (in CLP $MM) for woman-led and men-led entrepreneurship.
Source: Figure by authors.

Table I. Spearman's correlation matrix

	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Survival	0.37	0.48	1														
(2) Gender	0.11	0.32	-0.0976*	1													
(3) Financing	30.01	17.38	-0.1815*	-0.0946	1												
(4) Industry Tech	0.53	0.49	-0.0019	-0.1285*	0.0972	1											
(5) Entrepreneurial Exp	0.28	0.45	-0.0983*	-0.0883*	0.1339*	0.0307	1										
(6) Work Exp	0.35	0.48	-0.0206	-0.0459	0.1190*	0.0085	0.2550*	1									
(7) Age	42.41	8.92	0.0132	0.0072	-0.0919	-0.0612	-0.1007	0.0922	1								
(8) Hs-Tp education	0.06	0.24	0.0855*	0.0165	-0.0571	-0.0472*	-0.0412	-0.0161	0.0110	1							
(9) Undergraduate	0.65	0.47	-0.0585*	0.0609*	-0.0043	-0.0543*	0.0033	0.0032	-0.0897	-0.3671	1						
(10) Postgraduate	0.27	0.44	0.0147	-0.0737*	0.0362	0.0837*	0.0194	0.0055	0.0890	-0.1653	-0.8567	1					
(11) North R.	0.66	0.47	0.0318	-0.0361	0.1823	0.0609*	0.0306	0.0093	-0.0698	-0.0097	-0.0490*	0.0574	1				
(12) Center R.	0.16	0.37	0.0405	0.0095	-0.0871	0.0203	-0.0493*	0.0043	0.0048	0.0714*	-0.0250	-0.0131	-0.6418	1			
(13) South R.	0.16	0.36	-0.0818*	0.0364	-0.1444	-0.0985*	0.0111	-0.0163	0.0844	-0.0602*	0.0881*	-0.0600	-0.6246	-0.1980	1		
(14) Year	2012.69	1.25	0.04047	0.0094	-0.0893*	-0.0492	0.0042	0.0011	0.0203	-0.0267	0.0047	0.0713*	-0.0249	-0.0130	-0.6417	1	
(15) Program	0.16	0.36	-0.0818*	0.0364	-0.1437*	0.011*	-0.0162	0.1099*	-0.0985*	0.0328	-0.0022	-0.06*	0.0880*	-0.0599	-0.6246	-0.198*	1

*** Indicates significance at the p < 0.05 level of confidence**

Source: Table by authors.

Sample Characteristics

Table II presents the sector distribution across sample, highlighting that Information Technology represents the most frequent sector (21.2% of startups) while exhibiting the lowest female leadership rate at 5.3%. Female leadership varies significantly across sectors, ranging from 0% in Public Administration to 30.3% in Manufacturing.

Table II: Sector Distribution and Female Leadership Representation

Sector	Total Firms	Female-led	Female Rate (%)
Information Technology and IT Services	188	10	5.3%
Transportation, Construction, Infrastructure	90	7	7.8%
Business and Financial Services	67	4	6.0%
Commerce	66	10	15.2%
Food	62	16	25.8%
Other	57	6	10.5%
Advertising and Creative Industries	57	4	7.0%
Tourism	37	8	21.6%
Education	35	5	14.3%
Manufacturing	33	10	30.3%
Biotechnology and Biomedicine	28	6	21.4%
Agriculture	28	6	21.4%
Health and Pharmaceuticals	28	1	3.6%
Mining and Metallurgy	27	2	7.4%
Multisectoral	27	2	7.4%
Social	24	5	20.8%
Fruit, Wine and Horticulture	17	2	11.8%
Fishing and Aquaculture	12	2	16.7%
Forestry	4	1	25.0%
Public Administration	1	0	0.0%
Total	888	107	12.1%

Table II presents a detailed comparison of startup characteristics based on gender. Notable differences emerge across multiple dimensions: female-led startups are significantly underrepresented in technology sectors (35.5% vs 55.6% for male-led) but show higher concentration in non-technology industries. Educational patterns reveal female entrepreneurs are more likely to have undergraduate degrees but less likely to hold postgraduate qualifications. Most significantly, female entrepreneurs exhibit substantially lower rates of prior working experience (29.0% vs 36.6%) and entrepreneurial experience (17.8% vs 30.2%), suggesting distinct entry pathways into high-growth entrepreneurship that may contribute to their different survival patterns.

Table II: Comprehensive Comparative Analysis of Male-led vs Female-led Startups

Characteristic	**Male-led (n=781)**	**Female-led (n=107)**	**Difference (pp)**
SECTOR DISTRIBUTION			
Technology Sector	434 (55.6%)	38 (35.5%)	-20.1
Non-Technology Sector	347 (44.4%)	69 (64.5%)	+20.1
EDUCATION LEVEL			
Technical/High School	51 (6.5%)	8 (7.5%)	+1.0
Undergraduate	504 (64.5%)	77 (72.0%)	+7.5
Postgraduate	226 (28.9%)	22 (20.6%)	-8.3
REGIONAL DISTRIBUTION			
North Region	131 (16.8%)	19 (17.8%)	+1.0
Center Region	529 (67.7%)	67 (62.6%)	-5.1
South Region	121 (15.5%)	21 (19.6%)	+4.1
PRIOR EXPERIENCE			
Work Experience	286 (36.6%)	31 (29.0%)	-7.6
No Work Experience	495 (63.4%)	76 (71.0%)	+7.6
Entrepreneurial Experience	236 (30.2%)	19 (17.8%)	-12.4
No Entrepreneurial Experience	545 (69.8%)	88 (82.2%)	+12.4

To formally test our hypotheses and move beyond the descriptive analysis, we employed a series of Cox proportional hazards regression models. This method is particularly well-suited for our study as it allows us to analyze the influence of various predictors on the time-to-event outcome (firm failure) while appropriately accounting for right-censored data.

The results are presented in Table III, which details a hierarchical series of four nested models designed to systematically evaluate our hypotheses. Model 1 serves as our baseline, including only the control variables. Model 2 introduces the primary independent variable, founder's gender, to test H1. Model 3 incorporates public funding to assess its main effect (H2). Finally, Model 4 includes the interaction term between gender and funding to test for the proposed moderating effect (H3). The table reports hazard ratios, where a value below 1 indicates a decreased risk of failure and thus a higher likelihood of survival.

Table III. Cox proportional hazards models

Variables		Model 1 Control	Model 2 Gender	Model 3 Financing	Model 4 Interaction
Independent variables					
Gender	Women	-	0.5743** (0.1483)	-	0.7717 (0.6524)
log(Financing)		-	-	0.5907*** (0.0581)	0.5909*** (0.0605)
Control variables					
Education	Undergraduate	0.6210** (0.1388)	0.6062*** (0.1391)	0.6545** (0.1387)	0.6445** (0.1393)
	Postgraduate	0.6793* (0.1495)	0.6565** (0.1496)	0.7308. (0.1496)	0.7175* (0.1499)
Entrepreneurial Experience	Yes	0.6936** (0.1053)	0.6682** (0.1035)	0.7609* (0.1044)	0.7372* (0.1045
Working Experience	Yes	0.9661 (0.0914)	0.9619 (0.0914)	1.0037 (0.0912)	0.9971 (0.0915)
Age		1.0041 (0.0046)	1.0042 (0.0046)	1.0012 (0.0046)	1.0013 (0.0046)

Continuity of table 3

Variables		Model 1 Control	Model 2 Gender	Model 3 Financing	Model 4 Interaction
Industry Tech		(0.0799)	(0.0803)	(0.0800)	(0.0804)
Region	North	1.2997* (0.1071)	1.3106* (0.1074)	1.2968* (0.1075)	1.3011* (0.1079)
	South	0.9497 (0.1293)	0.9585 (0.1298)	0.8989 (0.1284)	0.9063 (0.1289)
Interaction					
log(Financing)	Women	-	-	-	0.8962 (0.2179)
Year dummies		YES	YES	YES	YES
Finance program dummies		YES	YES	YES	YES
Number of cases		888	888	888	888
Number of failures		422	422	422	422
Likelihood Ratio test		117.7	133.9	197.8	216
AIC		8291.38	8277.21	8213.24	8199.13

Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Source: Table by authors.

Model 1 contains only the control variables, three of which are significant. First, the variable 'education' shows that company leaders with undergraduate studies (HR = 0.6210; $p < 0.01$) have a lower risk of failure (by 37.9%) compared to leader whose educational level is in the reference category (technical-high school). In addition, leaders that have finalized postgraduate studies (HR = 0.6793; $p < 0.05$) present a 32.07% lower risk of failure than leaders with technical-high school studies, all other variables held constant. The second variable that was statistically significant in this model was previous 'entrepreneurial experience'. Company leaders with previous entrepreneurial experience (HR = 0.6936; $p < 0.01$) have a 30.64% lower risk of failure than leaders without previous experience. With respect to 'geographical location', we observe significant effects between companies located in the North Region (holding the Center Region as the reference category) (HR = 1.2997; $p < 0.05$), with an increase in the risk of failure of 29.97%. 'Work experience' and the 'age' of the leader and 'industry tech' are not statistically significant in this model; therefore, there is

not enough evidence to assert that these variables could generate an increase or decrease in the survival risk of the companies in our sample.

Model 2 includes all control variables and the independent variable ‘gender’. Our results are robust, indicating that women-led companies (HR = 0.5743, $p < 0.01$) present a lower risk of failure than those led by men. Women-led firms are 42.57% less likely to fail. This evidence supports our first hypothesis (H1), which indicates the role of female leadership in a company's survival. In this model, the positive effects of education in mitigating the risk of failure remain consistent and significant. However, there is a decrease in the gap between 'undergraduate' (HR = 0.6062; $p < 0.001$) and 'postgraduate' (HR = 0.6565; $p < 0.05$). The variable ‘entrepreneurial experience’ of the Leader (HR = 0.6682, $p < 0.05$) reduces the risk of company failure by 33.18% compared with leaders without previous experience. Finally, the ‘location’ variable maintains its significant effect, showing a 31.06% increase in the risk of failure compared with the reference category (HR = 1.3106; $p < 0.05$). The remaining control variables, including ‘work experience’, ‘industry tech’, and ‘age’, remain statistically insignificant.

In Model 3 we observe the independent variable ‘financing’. The results indicate that companies receiving higher amounts of public funding experience a significant decrease in their risk of failure (HR = 0.5907; $p < 0.001$). For every 1% increase in the received funding, the risk of failure decreases by 40.93%. It is observed that increased financing mitigates the risk of failure for a newly established company. This result suggests that companies receiving substantial funding are more likely to remain active than those that receive lower funding. In this model, the ‘education’ control variables are significant. Specifically, when the leader has an undergraduate educational level (HR = 0.6545; $p < 0.01$), a 34.55% reduction in the failure risk rate is observed compared with leaders whose educational level is technical or high school. The statistical significance of the risk associated with leaders holding postgraduate studies no longer holds significance at the 5% level to assert that possessing postgraduate studies mitigates the risk of failure compared with companies whose leader's educational level is technical or high school. With respect to previous ‘entrepreneurship experience’ (HR = 0.7609; $p > 0.1$), we observe a 23.91% decrease in the risk of failure. For the ‘geographical location’ variable, we observe a significant effect on survival for those companies located in north Chile (HR = 1.2968, $p < 0.05$), as they experience a 29.68% increase in their risk of

ceasing operations compared with companies located in the central/metropolitan region. There is no significant effect when comparing firms in the Southern Region (HR = 0.8989, p > 0.1) with companies located in the central/metropolitan region. The remaining control variables in Model 3, including ‘work experience’ (HR = 1.0037, p > 0.1), 'industry tech' (HR = 0.9018; p > 0.1), and 'age' (HR = 1.0012; p > 0.1), are not significant.

Finally, Model 4 includes the independent variables of interest and their interaction. In this model, ‘funding’ remains statistically significant (HR = 0.5909; p < 0.001). However, unlike Model 3, the ‘leader's gender’ is not significant (HR = 0.7717; p > 0.1). This result is due primarily to the inclusion of an interaction within the model. This variable has a larger standard error for this variable than Model 2 does (SE = 0.6524). Other variables, such as ‘geographic location’ and previous ‘entrepreneurship experience’ level, maintain their statistical significance, as in previous models. Note that the variable leaders with ‘postgraduate education’ (HR = 0.7175; p < 0.05) presents statistical evidence for a 28.25% reduction in the risk of failure. The interaction tested was ‘gender’ x ‘financing’ (GxF). This interaction aims to determine if there is a difference when the gender of the leader(s) is evaluated together with the awarded funding amount. However, this difference was not significant (HR (GxF) = 0.8962; p = 0.6906). Despite these results, a reduction in the AIC for this model (8199.13) can be noted, indicating better goodness of fit than that of the other models.

Robustness Checks

The instantaneous risk at the specific time of interest has been calculated to assess the relative risk of companies in their early stage (fourth and fifth years since their creation). We observed h(t;X) for the difference between female and male leadership, maintaining the same characteristics while keeping all other variables in their reference category. By year 4, the risk is 0.18 times greater for female leadership than for male leadership. By year 5, the difference in instantaneous risk is more pronounced, becoming 2.96 times greater for men than women, on the basis of the company's initial period. This discrepancy in instantaneous risk is supported by the results we have seen in the models from Table III, indicating a difference in the success of a company's survival from a gender perspective.

Confidence Interval Estimation

To further assess the robustness of our hazard ratio estimates, we applied bootstrapping—a resampling method with replacement that enables evaluation of multiple simulated outcomes through data randomization (Davison and Hinkley, 1997). This approach is particularly suited to our study due to significant gender differences in leadership representation among the sample companies. Bootstrapping generates N repetitions of the model to produce confidence intervals for hazard ratios that are more precise and reliable by mitigating sampling variability.

Bootstrapping results provide hazard ratio approximations across varying sample iterations within a 95% confidence interval, validating the risk mitigation indicated by our model variables. Notably, outliers can bias model estimates substantially (Jones, 1991); thus, sampling across multiple bootstrapped datasets reduces this uncertainty.

For Model 4—the model with the lowest AIC as demonstrated in Table IV—10,000 stratified proportional resamples were performed based on gender. Model coefficients and hazard ratios were estimated using the percentile method and bias-corrected and accelerated (BCa) confidence intervals.

Table IV. Estimation of confidence intervals by bootstrapping

	Bootstrap confidence intervals								
Variable	**Coefficient**	**Hazard Ratio (HR)**	**Percentile CI**			**BCa CI**			
Gender (Women)	-0.25	0.77	0.18	to	2.96	0.18	to	3.01	
log (Financing)	-0.52	0.59	0.52	to	0.66	0.53	to	0.67	
Undergraduate	-0.43	0.64	0.50	to	0.83	0.50	to	0.83	
Postgraduate	-0.33	0.71	0.54	to	0.93	0.54	to	0.93	
Entrepreneurial Experience	-0.30	0.74	0.59	to	0.91	0.59	to	0.91	

Continuity of table 4

Variable	Coefficient	Hazard Ratio (HR)	Bootstrap confidence intervals Percentile CI		BCa CI	
Working Experience	-0.002	1.00	0.83 to	1.19	0.83 to	1.19
Age	0.001	1.00	0.99 to	1.01	0.99 to	1.01
Industry Tech	-0.14	0.86	0.74 to	1.01	0.74 to	1.01
North Region	0.26	1.30	1.06 to	1.60	1.05 to	1.60
South Region	-0.09	0.91	0.70 to	1.16	0.70 to	1.16
Gender(Women) x log(Financing)	-0.10	0.90	0.56 to	1.44	0.56 to	1.44

N = 10.000; 95% confidence intervals

Source: Table by authors.

These methods were selected to accommodate the empirical resampling distributions observed for each coefficient, which exhibited asymmetries and excess kurtosis diverging from normality assumptions.

Proportional Hazard Assumptions

The proportional hazards assumption, a key prerequisite of the Cox model, was rigorously tested using Schoenfeld residuals (Grambsch & Therneau, 1994) as shown in Table V. Both global and individual covariate tests revealed no significant violations—specifically, the global test yielded $X^2\_16 = 18.5$ with a p-value of 0.30—affirming the model's appropriateness for this dataset.

Table V. Tests of Proportional Hazards Assumption Using Schoenfeld Residuals

Model 4			
Variables	X^2 value	Degrees of freedom	p-value
Gender	0.58	1	0.45
log(Financing)	2.22	1	0.14
Education	1.25	2	0.53
Entrepreneurial Experience	0.32	1	0.57
Working Experience	0.42	1	0.52
Age	0.82	1	0.36
Industry Tech	0.62	1	0.43
Region	3.02	2	0.22
Gender x log(Financing) (GxF)	0.58	1	0.45
Year dummies	2.87	1	0.09
Program dummies	7.00	4	0.14
Global model	18.50	16	0.30

Source: Table by authors.

Those intervals containing a value of one are considered nonsignificant variables. For example, the confidence interval estimated by percentiles for the hazard ratio of the gender variable ranges from 0.18 to 2.96. This result indicates that, within this sample, the decrease in risk when a company has female leadership could be as much as 82% or increase the risk by up to 196%, with 95% confidence. The interval contains a value of 1, which aligns with the results of Model 4, indicating that gender is not significant in that model.

On the other hand, the confidence interval based on BCa for financing amounts indicates that the variability in the data supports a decrease in the survival risk of a company between 33% and 47%, without including one within its interval. Again, this aligns with the results of Model 4, which helps to quantify the sampling bias present in the variables of interest according to the data used for this model.

4. DISCUSSION

Findings

The study results show that women-led businesses exhibit a higher survival than men-led businesses. Specifically, by the eighth year, the survival rate of women-led businesses was 49.2%, whereas for men-led businesses it was 31.4%. Additionally, the Cox proportional hazards model estimates indicate that the risk of failure is significantly lower for businesses led by women and those receiving public funding. The findings also reveal that previous

entrepreneurial experience and the educational level of the leader significantly impact business survival.

These findings shed light on the role of gender in the survival of innovative and high-growth potential ventures, offering significant insights for both academic research and practical applications. The higher survival rates of new ventures led by women support the findings of other studies regarding the performance gaps between male- and female-led firms (Farhat & Mijid, 2018; Brush et al., 2017; Jennings & Brush, 2013).

This challenges conventional narratives and previous research findings, where entrepreneurship scholars have found that new startups led by women are less successful than those led by men (Amoroso & Link, 2017; Boden & Nucci, 2000).

Theoretical Implications

Our results directly challenge the "female underperformance hypothesis" that has dominated much of the entrepreneurship literature, particularly in advanced economies. This divergence can be explained through several theoretical lenses that extend our understanding of entrepreneurial processes.

It is important to note that most entrepreneurship models and frameworks have been developed in advanced economies with characteristics that differ significantly from the Latin American context. According to Ruiz-Martínez et al. (2021), five contextual conditions are essential when analyzing women's entrepreneurship in Latin America compared to the Northern Hemisphere: 1) high rates of women's entrepreneurship; 2) high rates of informality; 3) traditional culture and self-expression values; 4) low rates of innovation-based ventures; and 5) developing ecosystems. These contextual factors help explain our findings of higher survival rates among women-led ventures in Chile, as they operate within a regional entrepreneurial landscape with distinctive characteristics that may reward different strategic approaches.

Furthermore, these findings confirm the importance of a business’s resources in its early stage, which in this case is through public funding in the form of subsidies, in addition to business services, networks, and training, resources obtained from the incubators and accelerators supporting these ventures (Bradley et al., 2021; Li et al., 2020). This highlights the importance of each company's competitive resources, enabling them to survive.

A critical aspect deserving further attention is the interrelationship between competitive resources and contextual factors in women-led businesses. Our findings directly engage with research from consultants in Latin America (Powers & Magnoni, 2010), which identify how women entrepreneurs frequently reinvest a higher proportion of their profits in family expenses (73% compared to 65.8% for men according to Bancamía data), which could partially explain differences in survival rates. This dynamic suggests that women adopt a more holistic and sustainable approach to business management, where resilience is based not only on financial resources but also on the social and family capital they develop. The higher survival rate of their ventures might be related to horizontal diversification strategies rather than vertical growth, prioritizing stability over rapid expansion, as indicated by Women's World Banking (2006) study with ADOPEM in the Dominican Republic, resulting in smaller but more stable and sustainable long-term income flows (Powers & Magnoni, 2010).

In light of the qualitative Costa Rican study by Sandoval (2023), we can propose mechanisms to help explain the "survival premium" observed in our estimates. Sandoval's findings show that successful businesswomen emerge mainly through opportunity recognition and previous sectoral experience, and consolidate their businesses leveraged on human capital (perseverance, dedication) and social capital (personal and professional networks). This converges with our Cox model results on the importance of entrepreneurial experience and educational level, and suggests that the lower failure rate in women-led ventures could be mediated by a strategic orientation towards stability and relational quality (trust, reputation, personal satisfaction), rather than aggressive expansion goals.

From the Latin American evidence available in systematic reviews, the "gender-innovation-informality" axis remains understudied but provides an interpretive key to our results. In the region, female entrepreneurship operates with strong contextual embeddedness, high use of tacit knowledge and social networks, and often pursues success metrics that are not exclusively financial (e.g., stability, reputation, social utility). This pattern, documented for Latin America from a contextual approach to women-led enterprises (Ruiz-Martínez et al., 2021), offers a plausible mechanism for the "survival premium" we observe: relational risk management and incremental improvement (of processes/organization) favor more robust trajectories in the face of shocks, even when there

are gaps in scale or product innovation compared to male-led firms.

Notably, we are by no means suggesting that the disadvantages faced by women as entrepreneurs are due to gender per se. In contrast, women and men have similar entrepreneurial intentions (Elam et al., 2019) and innovation capacities (DeTienne & Chandler, 2007), and gender alone does not explain business performance (Du Rietz & Henrekson, 2000; Lee & Marvel, 2014). We postulate that women often start their entrepreneurial careers at a disadvantage relative to men due to complex social and contextual factors, including discrimination, socialization, and educational and occupational gender role stereotypes (Lim & Suh, 2019; Eccles, 2011; Tonoyan et al., 2020). These factors impede the integration of women into the business world. However, they are likely to succeed once they acquire the necessary competitive resources, drawing on their personal characteristics and motivations.

Practical Implications

The positive impact of public funding observed in our results must be interpreted within the context of structural barriers documented in Latin American studies. Powers and Magnoni (2010) highlight how women entrepreneurs in Latin America face specific limitations in accessing appropriate financial products for business growth. Typical microfinance products (small loans with short terms) often fail to meet the investment needs of growing businesses, disproportionately affecting women. The significant difference in survival rates might be explained by women's ability to maximize the value of limited resources, developing more adaptive and resilient business models in the face of constraints. This suggests that entrepreneurial support policies should focus not only on increasing access to financing but on designing specialized financial products (such as expansion loans with longer terms and lower rates) that allow women entrepreneurs to "graduate" their microenterprises to small businesses, thus capitalizing on their demonstrated sustainable business management capabilities.

Additionally, Sandoval documents that the greatest limitation in early and growth stages is financial—difficulty accessing credit and excessive bureaucracy—which offers a plausible causal pathway for the protective effect of public funding we observe: by alleviating initial liquidity scarcity, subsidies allow identified opportunities to be transformed into

sustained trajectories, particularly when combined with incubation services that strengthen networks and management capabilities.

In this framework, the protective effect of public funding we estimate acts as an enabler that allows the translation of already accumulated human and social capital into formal routines and absorption capacities, consistent with evidence that the integration of tacit knowledge and external support increases the probability of continuity of female entrepreneurships in contexts of informality. Similarly, the literature on financing and business survival, such as that presented by Audretsch and Lehmann (2005), supports the idea that access to public funding significantly reduces the risk of failure in emerging businesses.

In terms of policy implications for Latin America, our findings and the literature review suggest two main lines of action. First, redesigning pro-growth instruments with a gender and informality lens: "graduation finance" (longer-term expansion credit with lower burden), subsidies linked to learning milestones, and incubation/acceleration services that strengthen mixed networks and management and ICT capabilities, avoiding "cannibalization" biases of informal arrangements and recognizing the use value and social impact of "bottom-up" innovations. Second, better measurement and modeling: given the scarcity of regional studies on women, innovation, and survival in informality, we advocate for longitudinal designs and mediation models where the relationship between female leadership and lower exit risk is channeled through previous experience, educational level, social capital, and access to public funding. Incorporating multidimensional performance metrics (survival, growth, and non-financial objectives) is consistent with the recommendation to adopt contextual approaches for female entrepreneurship in the region and aligns evaluation with observed patterns of greater resilience and strategic prudence (Sharma & Dahlstrand, 2023)

5. CONCLUSION AND LIMITATIONS

This article provides significant contributions to the field of strategic management, making it relevant not only to management scholars but also to policymakers and entrepreneurs. Specifically, we contribute by providing evidence on the survival of new ventures and the resources necessary for this to occur (Wang & Zheng, 2022; Soto-Simeone et al., 2020), exploring how individual and firm-level characteristics shape survival during

their early years. Additionally, our article sheds light on theories from an emerging economic environment (Morris et al., 2023), which is novel and adds to what we have already learned from studies in high-income economies that connect survival and gender. Furthermore, we make a theoretical contribution because this study explains that high-growth potential firms benefit from having female leaders in these environments. Our results show that high-growth potential and innovative companies led by women are more likely to survive than those led by men.

We propose that new ventures' survival cannot be explained by a single condition, factor, or attribute in isolation; instead, efforts in this regard should consider conditions, attributes, and intermediaries as a whole. Recent studies shed light on why a female-led company survives over time. The first is the positive relationship between the risk propensity of women entrepreneurs and survival. The second reason concerning work-family balance is the negative relationship with business success. Women who start a business because they seek to combine work and family commitments are less likely to achieve business survival in the medium term (Rey-Martí et al.,2015)

The contributions of this article are particularly relevant as they offer a deeper understanding of the intersection between gender and entrepreneurial success in diverse contexts. By highlighting the factors that enable women-led startups to thrive, this research opens pathways for strategic management practices that promote inclusivity and support for female entrepreneurs globally. Furthermore, the insights gained can inform policy initiatives aimed at bolstering the entrepreneurial ecosystem, thereby facilitating sustainable economic growth and innovation.

This study presents several limitations that should be acknowledged. First, our focus on Chile limits the generalizability of findings to other contexts, despite providing valuable insights from an emerging economy. Second, the aggregate nature of the information provided by Corfo and the SII allows us to identify factors affecting survival but constrains our ability to understand the underlying mechanisms through which gender influences survival outcomes. Third, our dichotomous operationalization of gender (male/female) does not capture the full spectrum of gender identity nor the dynamic interactions between gender and other dimensions of identity (ethnicity, class, age) that may collectively shape entrepreneurial outcomes. Fourth, while we establish a survival advantage for women-led

ventures, our data structure does not allow us to fully disentangle whether this advantage stems from gender-specific strategic approaches, selection effects (where women face higher barriers to entry, resulting in only the most capable advancing to funding), or contextual factors unique to the Chilean entrepreneurial ecosystem.

Future research should address these limitations through several avenues: First, comparative studies across multiple Latin American countries could test the regional validity of our findings and identify contextual variables that moderate the relationship between gender and venture survival. Second, mixed-methods approaches incorporating qualitative elements could provide deeper insights into the specific strategic decisions, leadership styles, and resource orchestration practices that underlie the "survival premium" we observe in women-led ventures. Third, longitudinal designs with more granular data could explore the temporal dynamics of how gender influences different stages of the venture lifecycle, from inception through growth and maturity phases. Fourth, researchers should investigate potential mediating mechanisms between female leadership and survival, such as risk management approaches, financial decision-making patterns, team composition strategies, and customer relationship practices. Fifth, studies could examine how startup culture (Sandberg, 2025) and gender dynamics interact in Latin American contexts, where cultural expectations regarding gender roles may differ from those in high-income economies. Finally, beyond survival, future studies could examine other performance dimensions, such as scaling trajectories, innovation outputs, profitability metrics, and social impact indicators, to develop a more nuanced understanding of gender-based performance differences.

Our findings have direct implications for entrepreneurial policy design and implementation, particularly in emerging economies. First, the strong protective effect of public funding on women-led ventures suggests that gender-sensitive allocation of entrepreneurial resources represents not merely a social justice imperative but a strategic investment with superior survival returns. Policy designers should consider developing specialized financial instruments that address the unique constraints faced by women entrepreneurs, such as "graduation finance" programs featuring longer terms and lower burdens that bridge the gap between microfinance and traditional business loans.

Second, our results indicate that entrepreneurial support programs should evolve beyond merely increasing access to capital to provide integrated ecosystems of support.

Specifically, incubation and acceleration services should be tailored to strengthen the capabilities that our analysis identifies as critical survival determinants: formal education, entrepreneurial experience, and network development. Programs might include mentorship matching that connects novice women entrepreneurs with experienced female founders, specialized training modules addressing gender-specific challenges in negotiation and resource acquisition, and networking initiatives that intentionally bridge the gender divide in entrepreneurial communities.

Third, the significant survival premium we observe for women-led ventures suggests that conventional entrepreneurial success metrics focused exclusively on rapid growth and scale may undervalue important dimensions of sustainability and resilience. Support programs and investors should consider adopting more nuanced evaluation frameworks that recognize strategic orientations toward stability, quality, and long-term viability as legitimate and valuable entrepreneurial approaches. This may require recalibrating expectations around growth trajectories and developing performance metrics that capture the multidimensional nature of entrepreneurial success in emerging market contexts.

Finally, our research underscores the importance of context-sensitivity in entrepreneurial policy. The Latin American entrepreneurial ecosystem, characterized by high informality, developing support structures, and distinct cultural dynamics around gender (Ruiz-Martínez et al., 2021), requires approaches that differ from those developed in high-income economies. Policymakers should leverage indigenous knowledge and locally-developed models of entrepreneurial support that resonate with the regional context, while adapting global best practices to address the specific challenges and opportunities faced by women entrepreneurs in Latin America.

AUTHOR CONTRIBUTIONS

Author Contributions

- Beatriz Millán: Conceptualization (lead); Methodology (lead); Formal analysis (lead); Investigation (lead); Writing – original draft (lead); Writing – review & editing (lead); Project administration (lead).
- Katherina Kuschel: Conceptualization (equal); Methodology (supporting);

Supervision (equal); Resources (lead); Writing – review & editing (equal).

- Carla Bustamante: Conceptualization (equal); Methodology (equal); Resources (supporting); Supervision (equal); Writing – review & editing (equal).
- Juan Antonio Carrasco: Methodology (supporting); Formal analysis (equal); Supervision (equal); Writing – review & editing (equal).
- Pablo Catalán: Resources (lead); Conceptualization (supporting).

Contribution during the Peer-Review Process

During the first round of review, Beatriz Millán led the preparation of the response to the reviewers, coordinated the manuscript revision process, incorporated the main requested changes, revised the theoretical framework and discussion, and refined the interpretation of the empirical results. The co-authors contributed by reviewing the revised version of the manuscript, providing conceptual, methodological, and analytical feedback, and strengthening specific sections according to their respective areas of expertise.

During the second round of review, Beatriz Millán led the preparation of the final response to the reviewers and incorporated the additional changes requested by the journal. The co-authors reviewed and approved the revised version, contributed to the clarification of specific arguments, and provided comments aimed at ensuring the coherence, rigor, and consistency of the final manuscript.

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The datasets generated and analyzed during the current study are not publicly available because the Corfo database is not public due to information related to individualized persons, but they are available upon reasonable request from the corresponding author.

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CAPÍTULO 3

Survival, Resilience, and Entrepreneurial Capital in Women's Cleantech Ventures in Emerging Economies.

Este capítulo incorpora el manuscrito correspondiente al artículo enviado a evaluación a una revista científica. A continuación, se presenta la versión sometida a la revista, la cual forma parte de los productos académicos derivados del trabajo de tesis doctoral.

Artículo enviado

Millán Jara, B., Kuschel Rietzsch, K., Bustamante Viveros, C., Carrasco Montagna J. (2026). Survival, Resilience, and Entrepreneurial Capital in Women's Cleantech Ventures in Emerging Economies. En consideración para el special issue "Extending the Boundaries of Women's Entrepreneurship". *International Journal of Gender and Entrepreneurship.*

SURVIVAL, RESILIENCE, AND ENTREPRENEURIAL CAPITAL IN WOMEN'S CLEANTECH VENTURES IN EMERGING ECONOMIES

ABSTRACT

Purpose: This study examined differential patterns of business survival in cleantech ventures led by women versus men in emerging economies, specifying conditions under which female leadership predicts business resilience, and investigating whether structured entrepreneurial development interventions modify psychological variables of resilience.

Design/Methodology: A sequential mixed-methods approach was used, integrating: longitudinal survival analysis of 185 Chilean cleantech ventures (48 led by women, 137 by men; period 2005-2023) using Kaplan-Meier and Cox regression with cure fraction to differentiate companies susceptible to failure from those inherently resilient, and pre-post quasi-experimental evaluation of an acceleration program in Chile (n=21 female entrepreneurs) assessing entrepreneurial skills, self-confidence, and resilience.

Findings: A lower survival rate was confirmed in ventures led by women (HR=1.62, $p<0.001$). Cluster analysis identified a "Cluster of Entrepreneurs in Need of Social Capital" (39% survival), characterized by limited access to financial and social capital. However, an acceleration program in Chile demonstrated significant increases in entrepreneurial skills ($p<0.001$) and self-confidence ($p<0.001$), validating the role of Communities of Practice in psychological capital.

Implications for Research: Enriches RBV through cure fraction models for gender disparities; extends literature on psychological capital by validating CoP interventions in emerging contexts.

Practical Implications: Provides guidelines for public policy emphasizing specific interventions that address social, financial, and psychological capital gaps.

Keywords: Female entrepreneurship, Cleantech ventures, Business survival, Entrepreneurial self-confidence, Resource-Based View, Emerging economies

Article classification: Research Paper

1. INTRODUCTION

Context and Magnitude of the Research Problem

Women's participation in cleantech entrepreneurship remains a persistent global gap in sustainable innovation ecosystems. In Europe, women are 23% of founders and receive 2.2% of sector capital, while all-male teams capture 93% of investments (Mets & Vettik-Leemet, 2024). In the United States, funding for all-female teams fell from 2.1% in 2021 to 1.8% in 2023, signaling a systematic decline in gender equity despite sector growth (Mets & Vettik-Leemet, 2024). In India, women lead about 18% of green ventures and face barriers to financing, explicit bias in investment evaluations, and exclusion from incubation programs (Gupta, 2025).

Latin America reproduces these disparities: women represent under 30% of regional entrepreneurship and are underrepresented in sectors with high environmental impact such as renewable energy and the circular economy (Mets & Vettik-Leemet, 2024). This underrepresentation reinforces gender inequalities and narrows the diversity of perspectives, business models, and innovation strategies addressing the climate crisis. The literature consistently shows that mixed-gender teams in sustainability exhibit greater adaptability and alignment with the triple bottom line; excluding women thus diminishes equity and ecosystem efficiency (Adeola et al., 2023; Brush et al., 2018).

The Chilean Case as a Strategic Empirical Context

Chile emerges as a relevant case for examining these tensions between gender, cleantech innovation, and public policy in emerging economies. The country has undergone an accelerated transformation of its energy matrix, increasing its installed renewable capacity from 185 GW in 2013 to more than 300 GW in 2022, driven by a pro-competitive regulatory framework, binding targets for non-conventional renewable energy (NCRE), and the systematic use of competitive auctions that drastically reduced solar and wind generation costs (Seminario-Córdova, 2023; Zamorano, 2024). Between 2010 and 2022, Chile attracted more than USD 15 billion in foreign direct investment in renewable energy, consolidating its position as a regional leader in energy transition and positioning itself as an emerging player

in the export of green energy and renewable hydrogen (Zamorano, 2024).

However, this sectoral dynamism coexists with pronounced gender gaps in STEM entrepreneurship and access to innovation financing. Data from CORFO, the public agency for productive development that has channeled more than USD 500 million into technology-based ventures since 2005, reveal that women founders have disproportionately less access to seed capital instruments and higher rejection rates in competitive calls for proposals, even when controlling for previous experience, technical training, and project characteristics (Recalde, 2015). At the same time, the Chilean cleantech ecosystem lacks specific gender programs in innovation and clean energy, leaving it up to women entrepreneurs themselves to negotiate their inclusion in value chains dominated by large public utilities, industrial conglomerates, and traditionally male-dominated investment funds (Obuseh et al., 2025).

Empirical Gap and Contribution of the Study

Despite the strategic importance of the cleantech sector for decarbonization and sustainable development goals, research on gender-differentiated business survival in this domain remains fragmented and concentrated in developed economies. Studies in Europe and the United States have documented that cleantech ventures are capital intensive, require higher average amounts per financing round, and receive investment at later stages of the life cycle—approximately 0.6 years later than traditional technology ventures—reflecting a high perceived risk profile that discourages early investment (Cumming et al., 2016; Bianchini & Croce, 2022; Ambrois et al., 2025). When gender variables are introduced, the evidence reveals that cleantech entrepreneurs face a "double penalty": evaluation biases that question their technical credibility in male-dominated sectors, combined with greater risk aversion on the part of investors who perceive women-led ventures as less scalable (Mets & Vettik-Leemet, 2024; Malmström et al., 2020).

However, emerging research in Latin American economies suggests that, when controlling for structural factors such as access to public financing, institutional networks, and business model characteristics, women entrepreneurs in social and environmental impact sectors develop differentiated resilience strategies that prioritize financial sustainability over explosive growth, potentially improving their organizational longevity (Gupta, 2025; Adeola et al., 2024). This emerging literature lacks, however, robust methodological designs that

integrate longitudinal survival analysis with measurements of underlying psychosocial mechanisms, limiting the ability to formulate evidence-based recommendations for inclusive innovation public policies.

This study addresses this gap through a mixed methodological design that integrates two complementary components. First, a business survival analysis applied to 185 Chilean cleantech ventures registered between 2005 and 2023, using advanced Kaplan-Meier and Cox proportional hazards models to quantify how female leadership, access to public financing (CORFO instruments), the environmental impact of the business model, and the density of collaborative networks interact to determine long-term viability. Second, a quasi-experimental intervention with 21 female cleantech entrepreneurs participating in an acceleration program in Chile, evaluating through a pre-post design the impact of structured training on entrepreneurial self-confidence, management skills, and psychological resilience, variables identified in the literature psychological capital literature as critical predictors of persistence in the face of failure (Luthans et al., 2007; Martínez Gregorio, 2023).

Research Questions and Main Contributions

The study seeks to answer two interconnected questions

RQ1: How does the gender of the founder influence the survival of cleantech ventures in Chile, and what role do the available resources and psychological capital of the founder play in this relationship?

RQ2: To what extent do programs aimed at strengthening the psychological capital of women entrepreneurs in cleantech improve this capacity and contribute to the survival of their businesses, also considering the influence of contextual factors?

The main contributions of this study are both theoretical and empirical. Theoretically, we enrich the Resource-Based View (RBV) by integrating a cure-fraction survival model, offering a nuanced view of how the “triple resource gap” (human, social, and financial capital) differentially affects the survival of women-led cleantech ventures (Brush et al., 2018). We also extend the literature on psychological capital (Luthans et al., 2007) by empirically showing that Communities of Practice (CoP) interventions strengthen self-

efficacy and resilience—fundamental elements for persistence and success (Zhao et al., 2005; Molina-López et al., 2021). The use of cluster analysis yields a typology of cleantech ventures, revealing ecosystem heterogeneity and the gender intersection in entrepreneurial risk, advancing segmentation of female entrepreneurship (Hebert, 2025; Caretta & Vela-Almeida, 2025).

Empirically, the study provides robust evidence from Chile, an emerging economy with institutional particularities that can amplify gender challenges. A longitudinal survival analysis with advanced methods, plus a quasi-experimental evaluation of an acceleration program (n=21) assessing entrepreneurial skills, self-confidence, and resilience, lends strong rigor. Practically, it offers actionable implications for policymakers, investors, program designers, and universities. By identifying vulnerable profiles (e.g., "Cluster 3: Women Entrepreneurs in Need of Social Capital") and demonstrating CoP effectiveness, the study guides targeted interventions to strengthen social and psychological capital and foster a more equitable cleantech ecosystem.

2. THEORETICAL FRAMEWORK

2.1 Resource-Based View and Female Entrepreneurship in Impact Sectors: Theoretical Integration

The Resource-Based View (RBV) posits that sustained performance differences arise from heterogeneous endowments and the strategic orchestration of internal resources that meet VRIO criteria: Valuable, Rare, Inimitable, and Organizationally Capturable (Barney, 1991; Wernerfelt, 1984). In female entrepreneurship within sustainability sectors, early cleantech ventures rely on resources that are direct extensions of the founder's human, social, and financial capital, particularly under structural scarcity (Brush et al., 2018; Welsh et al., 2017). While established firms compete with codified tangible assets, new technology ventures depend more on intangible resources—tacit sectoral experience, professional reputation, institutional legitimacy, and networks of trust—that offer both a competitive edge and a barrier to entry for outsiders (Hebert, 2025; Colombelli et al., 2013).

The gender entrepreneurship literature documents a triple resource gap that reshapes RBV. Devalued human capital: despite STEM credentials, women are evaluated by investors on retrospective proof of skills, while men are judged on future potential, forcing women to

accumulate disproportionate credentials (Kanze et al., 2017; Malmström et al., 2020; Koch et al., 2025). Peripheral social capital: networks are dense and trusted but less connected to financial/political power, limiting the conversion of social into financial capital (McDonald, 2011; Waldström & Madsen, 2007; Stahl et al., 2023). Restricted financial capital: women capture 1.8–2.2% of global VC despite representing 23–30% of founders in sustainability sectors, reflecting biases about scalability (Mets & Vettik-Leemet, 2024; Brush et al., 2017).

Nevertheless, these constraints generate differentiated resilience strategies and dynamic capabilities. Women develop “resource bricolage,” substituting economic capital with strategic alliances and social legitimacy to prioritize operational efficiency, financial sustainability, and business models aligned with community and government stakeholders, reducing dependence on volatile external financing (Adam et al., 2022; Brush et al., 2018; Foss et al., 2018). In developing contexts, social and environmental projects led by women may be more durable when other factors align, given their prudent approaches fit energy-transition timeframes and long-term utility agreements; contract stability becomes key over explosive growth (Gupta, 2025; Adeola et al., 2023).

2.2 *Public Financing as a "Bundle" of Strategic Resources: Extension of RBV*

Conceptualizing public financing as a mere injection of liquidity underestimates its multidimensional nature as a complex configuration of tangible and intangible resources that simultaneously activate human and social capital (Hebert, 2025; Donaldson et al., 2024). Instruments such as CORFO's competitive subsidies in Chile operate through four interconnected mechanisms that transcend the nominal value of the capital transferred:

Public financing should be viewed as a multidimensional configuration of tangible and intangible resources that simultaneously activate human and social capital (Hebert, 2025; Donaldson et al., 2024). CORFO’s competitive subsidies in Chile operate through interconnected mechanisms that transcend the cash value transferred.

First, signaling quality under information asymmetry. Signaling theory posits that when private investors face uncertainty about technological viability and team competence, a government grant provides a noise-free signal certifying the project to market actors (Islam et al., 2017; Kleer, 2010; Colombo, 2020). For cleantech entrepreneurs, this certification mitigates implicit gender biases in investment evaluations: a CORFO subsidy acts as a

substitute for uncodified male credentials (networks of old acquaintances, corporate experience, elite education), leveling the playing field in subsequent private VC rounds (Gamba & Kleiner, 2001; Malmström et al., 2020).

Second, institutional legitimation that reduces liability of newness. Public sponsorship confers legitimacy, facilitating access to corporate clients, suppliers, and utility partnerships, and lowering transaction costs in B2B negotiations. In Chile, CORFO affiliation functions as a seal of trust amid dominance by large incumbents (Obuseh et al., 2025; Zamorano, 2024).

Third, access to mentoring ecosystems and tacit knowledge. Non-financial components—workshops, mentoring, angel networks, accelerators—are critical; evidence suggests the educational component predicts growth more than seed capital, especially for female founders with limited exposure to corporate management and investor negotiations (Ratinho et al., 2010; Avnimelech & Rechter, 2022; Rosado-Cubero et al., 2024).

Fourth mechanism: Buffering against external shocks and absorption capacity. Public funding allows R&D operations to be maintained during periods of economic contraction, sectoral recessions, or regulatory volatility, strengthening resilience (Muñoz et al., 2020; Gao et al., 2024; Ge et al., 2025). In capital-intensive sectors such as cleantech, where technological development times exceed typical venture capital horizons (3-5 years) and profitability depends on volatile public policies (feed-in tariffs, NCRE targets, battery subsidies), the provision of "extended runway" (runway extension) is critical to avoid premature closures of technically viable but financially vulnerable ventures (Bianchini & Croce, 2022; Ambrois et al., 2025).

The integration of these four mechanisms forms a synergistic "bundle" where the total value exceeds the sum of the individual components. This conceptualization extends traditional RBV—focused on internal firm resources—toward an ecosystemic perspective where public policies compensate for structural disadvantages through institutional orchestration of resources that entrepreneurs could not mobilize individually given their peripheral social capital and lesser bargaining power in financial markets (Brush et al., 2018; Sheng et al., 2024).

2.3 Psychological Capital as a Mediating Mechanism: Self-Confidence, Resilience, and Entrepreneurial Persistence

The literature on entrepreneurial psychological capital identifies four psychosocial dimensions as predictors of persistence in the face of failure and strategic adaptability: self-efficacy (confidence in one's own abilities to perform entrepreneurial tasks), resilience (ability to recover from setbacks), hope (goal orientation and generation of alternative paths), and optimism (attribution of positive events as stable and controllable) (Hartmann et al., 2022; Wang et al., 2022). These psychological variables operate as intangible resources at the individual level which, under the RBV framework, constitute valuable assets that are rare (heterogeneously distributed among the entrepreneurial population), inimitable (rooted in specific biographical histories), and organizationally captureable through support and training structures (Bandura, 1997; Kellermanns et al., 2014; Welter & Scrimpshire, 2021).

Psychological capital is especially relevant for women entrepreneurs in sustainability for three contextual reasons. First, they face higher rejection rates in funding, which erodes self-efficacy through cumulative negative feedback; interventions that restore confidence via vicarious modeling (female success stories) and verbal persuasion (affirming mentoring) counteract this erosion (Kanze et al., 2017; Bandura, 1997). Second, they operate in sectors with high technological and regulatory uncertainty, where resilience—cognitive flexibility to reinterpret failures as learning—differentiates ventures that pivot from those that persist in unviable models (Connor & Davidson, 2003; Toroslu et al., 2023). Third, they pursue triple-impact models (economic-social-environmental) whose viability requires extended time horizons, demanding realistic optimism to sustain intrinsic motivation when financial returns are deferred (Jennings & Brush, 2013; Schaltegger & Wagner, 2010; Domańska et al., 2023).

Experimental evidence suggests that structured psychological capital development interventions generate sustained increases in self-efficacy and resilience, mediating the relationship between institutional support and proactive entrepreneurial behaviors (seeking additional financing, expanding networks, strategic experimentation) (Luthans et al., 2007). However, translating psychological improvements into organizational survival and growth requires these changes to crystallize into dynamic capabilities: sensing, seizing, and reconfiguring skills that link individual psychology to performance (Teece, 2007; Collins, 2020; Engelmann, 2023).

2.4 Business Survival Analysis: Methodological Framework for Cleantech Ventures

Business survival analysis using time-to-event models is the appropriate analytical approach when the outcome is dichotomous (closure vs. operational continuity), the time-to-event varies across units, and there is right-censoring (firms still operating at study end) (Clark et al., 2003; Schober & Vetter, 2018). Three structural characteristics of the cleantech ecosystem justify this methodology for studying gender-differentiated survival.

First, risk is not constant over time. The probability of closure is time-varying; the so-called "valley of death" typically occurs 2–4 years after registration, as seed capital depletes before milestones attract Series A financing (Soto-Simeone et al., 2020; Li & Zheng, 2023). Survival models capture this dynamic through hazard functions h(t), identifying critical windows for impactful interventions (Lotti, 2013; Magdalena et al., 2024).

Second, informative censoring. A substantial share of ventures remain active at the end (2023 in this study), creating right-censoring that logistic regression and contingency tables cannot handle without bias (Rossello & González-Del-Hoyo, 2021). Kaplan-Meier estimators and Cox models incorporate censored observations via follow-up time, improving efficiency and inference (Kaplan & Meier, 1958; Cox, 1972).

Third, covariate heterogeneity and interactions. Survival depends on complex configurations of gender, financing access, human capital, sector, and regulation. The Cox model estimates adjusted hazard ratios (HR) to show each predictor's effect while holding others constant (Bradburn et al., 2003; Xu et al., 2020). Extensions include time-dependent covariates (e.g., additional CORFO funding, regulatory changes) and cure models for populations with negligible residual risk within horizons, capturing dynamic risk and long-run stability (Toroslu et al., 2023; Dirick et al., 2016; Santo et al., 2022).

3. METHODOLOGY

This research adopted a mixed study design to explore survival factors in cleantech ventures and evaluate the impact of a program supporting female entrepreneurship. This approach combines a quantitative longitudinal analysis of companies with a pre-post quasi-experimental design for the evaluation of an intervention. The study was conducted in the context of the emerging Chilean economy, covering a period of business data analysis from 2005 to 2023 and a longitudinal intervention between July and November 2025.

3.1. Study Design

The methodological design was structured around two interrelated components:

Survival Analysis and Clusters of Cleantech Companies: This component used a longitudinal quantitative approach to examine the survival trajectory of cleantech ventures, identifying factors that affect their operational duration and clustering patterns among them. Special attention was paid to the impact of the gender of the leader and other business and human capital characteristics.

Quasi-Experimental Evaluation of the Intervention: An Acceleration Program in Chile: A pre-post design was implemented to evaluate the impact of an acceleration program in Chile; Creation of a Community of Practice to Stimulate Women's Entrepreneurship and Innovation in the Cleantech Sector. This design allowed for a comparison of perceptions of entrepreneurial skills, self-confidence, and social capital before and after participation, quantifying the effectiveness of the intervention in the development of female entrepreneurial capital.

3.2. Data Sources and Sample

The research used two main data sources:

3.2.1. Business Survival Data

The database for the survival analysis was constructed from administrative records of 185 Chilean cleantech ventures, beneficiaries of programs run by the Chilean Economic Development Agency (CORFO), and supplemented with information from the Internal Revenue Service (SII). These companies were created between 2003 and 2017, with follow-up for up to 8 years from their incorporation until the cessation of operations or, , the end of the observation period (2023). The final sample consisted of 185 observations, with a notable gender imbalance: 74.1% of companies were led by men and 25.9% by women, which is considered representative of the Chilean cleantech ecosystem.

3.2.2. Data from the acceleration program in Chile

To assess the impact of an acceleration program in Chile, primary data was collected from participating female cleantech entrepreneurs.

Population and data collection: Women leaders of Chilean cleantech ventures enrolled in the program. Data come from two structured questionnaires: a pre-test (July 2025, Annex A) at program start and a post-test (November 2025, Annex B). The pre-test established baselines in sociodemographic data, entrepreneurial experience, and perceptions of skills and self-confidence. The post-test repeated these sections and added questions on program evaluation, perceived changes, and an open-ended qualitative section. The sample includes all women active in the Community of Practice, with rigorous follow-up to maximize response rate.

3.3. Measurement of Variables

The variables were operationalized for both components of the study:

3.3.1. Variables for Business Survival Analysis

Dependent Variable:

Business Survival (*SurvivalSurvival*): Binary (0 = active, 1 = ceased activities) with time to event or censoring in years.

Independent Variables:

[TABLE I NEAR HERE]

3.3.2. Variables for Evaluating the Acceleration Program in Chile

Measured mainly using 5-point Likert scales (1=Very low/Strongly disagree; 5=Very high/Strongly agree).

Entrepreneurial **Skills:** Composite score of 5 items on identifying opportunities, partnerships, pitching to funders, calculating value, and business model vision.

Self-Confidence: Composite score of 10 items assessing confidence in ability to manage the project, solve problems, manage a team, make decisions, overcome gender barriers, etc.

Community of Practice Evaluation (*CoP_Evaluation*): Includes assessment of module quality, learning experience, methodology, networking, and overall impact.

Perceived Positive Changes (*Perceived_Changes*): Post-test evaluation of personal changes (self-confidence), professional changes (management, decision-making), and changes in entrepreneurship (positioning, sales, financing).

3.4. Data Analysis Methods

The analyses were performed using R statistical software.

3.4.1. Descriptive Analysis

Descriptive statistics (means, standard deviations, frequencies) were calculated for all variables, with special emphasis on gender comparisons in the sample of cleantech companies and in the participants in the intervention.

3.4.2. Business Survival Analysis

Kaplan-Meier curves: The survival function was visualized and compared between key groups (e.g., by gender of the leader), using Log-Rank tests for significance.

Cox Proportional Hazards Regression Models: A multivariate model that identified predictors of cessation risk. Given the limitation observed in preliminary analyses (lack of significance for some covariates, possibly due to unobserved heterogeneity or "cured" cases), it was complemented with:

Survival Model with Cure Fraction: This advanced model allowed us to estimate the proportion of companies "immune" to the event (cessation) and model the time to the event for those susceptible, offering a more robust representation of business survival dynamics, crucial for ventures with high resilience.

3.4.3. Cluster Analysis

Hierarchical clustering was used to segment cleantech companies based on variables such as the age and experience of the leader, number of partners, financing, and region. The

clusters identified will be characterized descriptively and through statistical tests to compare their profiles and analyze gender distribution.

3.4.4. Pre-Post Intervention Analysis

Paired Means Comparison: Paired Student's t-tests were used to evaluate significant changes in entrepreneurial skills and self-confidence between the pre-test and post-test.

Qualitative Content Analysis: Open-ended responses from the post-test were subjected to thematic content analysis to identify patterns and enrich the interpretation of quantitative results on the program's impact.

3.5. Ethical Considerations

Ethical protocols were approved by the relevant academic institution. **Informed consent** was obtained from all participants in the intervention evaluation, ensuring the confidentiality of their responses and their right to withdraw. All data were **anonymized and treated with strict confidentiality**, with results presented in aggregate form to safeguard privacy.

4. RESULTS

This section presents the findings derived from the analysis of business survival data in Chilean cleantech ventures and the impact assessment of an acceleration program in Chile. The results are structured into four subsections: sample characteristics and descriptive analysis, business survival analysis, cluster analysis, and evaluation of the Community of Practice.

4.1. Sample Characteristics and Descriptive Analysis

The sample for the business survival analysis consisted of 185 Chilean cleantech ventures. A marked gender imbalance was observed in leadership, with 137 (74.1%) companies led by men and 48 (25.9%) by women, reflecting the structure of the Chilean entrepreneurial ecosystem in the sector.

In terms of survival, companies led by men showed an average survival rate of 52.6% during the study period, while those led by women had an average of 43.8%. This initial

descriptive difference suggests a disparity in business persistence.

Regarding the characteristics of the leaders' human capital, the average age was 44.2 years (SD=7.8), with a similar distribution between genders. The predominant educational level was undergraduate (45.3%), followed by postgraduate (32.4%) and secondary/technical (22.3%). Leaders with secondary/technical education showed the lowest survival rate. Previous work experience averaged 4.6 years (SD=3.1), concentrated at low values. In terms of previous entrepreneurial experience, 60.5% of leaders had no prior experience.

The average amount of financing received by the ventures was approximately USD$27,000, with surviving companies accessing higher amounts on average. The business model was divided between services (55.7%) and technology (44.3%). Most companies operated in the Metropolitan Region (58.9%).

A notable descriptive finding relates to the variable "Number of Women on the Team." Companies with women among the three main members showed a 54% probability of non-survival, while those without women had a 53% probability of non-survival. This result, although close in percentage, requires cautious interpretation in later stages, as it does not establish direct causality and may be influenced by multiple contextual or bias factors.

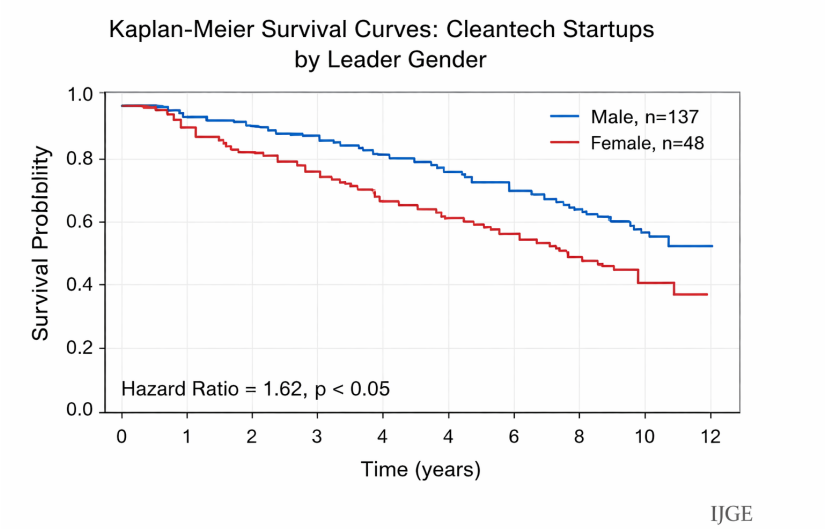
In the bivariate correlation analysis of the survival sample (n=185 Chilean cleantech startups), using Spearman and MIC tests, the "Period Index" (time of activity) and the "Secondary/Technical" category of the leader's educational level were the only variables that showed a statistically significant relationship with survival. Other key variables such as the leader's gender, amount of funding, and work and entrepreneurial experience did not reach statistical significance at the descriptive level.

4.2. Business Survival Analysis

4.2.1. Kaplan-Meier Curves

Kaplan-Meier curves (Figure 1) visually illustrated the cumulative survival function for cleantech ventures. A general trend was observed of lower probability of survival for companies led by women compared to those led by men over time. Log-rank tests confirmed a statistically significant difference between survival curves by gender ($p<0.05$), indicating that ventures with female leaders ace a higher risk of ceasing operations.

Figure 1: Kaplan-Meier curves. Source: Figure by authors



Source: Figure by authors.

4.2.2. Cox Regression Models and Hazard Ratio

The standard Cox proportional hazards regression model initially revealed no statistically significant effects for most individual variables, including leader gender, funding amount, or experience, on the risk of cessation of activities. This suggested the limitation of the standard model to capture the heterogeneity present in the sample, particularly the possible existence of a "fraction of cure" of highly resilient companies that are immune to the event of interest.

To address this limitation, a **Survival Model with Curing Fraction** was implemented. The results of this model (Table II) indicated that a significant proportion of cleantech ventures (approximately 30%) could be considered "cured," that is, with a very low probability of long-term cessation of activities.

[TABLE II NEAR HERE]

In the portion of the population susceptible to failure, the cure fraction model revealed crucial findings:

Gender of the **Leader:** Companies led by women in the susceptible group showed a significantly higher hazard ratio (HR = 1.45, p<0.01) compared to those led by men,

indicating a greater propensity to cease operations, controlling for other variables.

Educational Level: The leader's secondary/technical education was associated with a higher risk of cessation (HR = 1.82, $p<0.001$).

Amount of Financing: A higher logarithmic amount of financing was correlated with a lower risk of cessation in the susceptible fraction (HR = 0.85, $p<0.05$).

Entrepreneurial Experience: The leader's previous entrepreneurial experience significantly reduced the risk of cessation (HR = 0.70, $p<0.05$).

The cure fraction model therefore made it possible to identify that, although some ventures are highly resilient, in the segment susceptible to failure, female leadership is associated with a higher risk of cessation, along with other factors such as education and financing.

4.3. Cluster Analysis

Hierarchical cluster analysis identified three distinct groups of cleantech ventures, each with specific human capital, financing, and business strategy profiles (Table III).

[TABLE III NEAR HERE]

Cluster 1, this group consists of young entrepreneurs (35±5 years old) with no previous work or entrepreneurial experience, who lead large teams and have undergraduate degrees. Located mainly in southern Chile, they operate with moderate technology and varying access to financing. Despite the "responsibility of novelty" faced by newly created organizations (Yang & Aldrich, 2016), the strength of their teams and access to initial capital allows them to explore opportunities. Local social capital and regional ecosystems act as key facilitators for their early development, allowing them to mobilize informal resources and personal knowledge essential at this stage (Cordero & Lewis, 2023). They received average amounts of funding, and a higher proportion of this cluster corresponded to women leaders (35%). This cluster showed an intermediate survival rate (48%).

Cluster 2, this group comprises cleantech startups predominantly led by young leaders (60% aged 30–42) with little prior entrepreneurship experience (84.9%). Most operate in the

Metropolitan Region (94.3%), and 60.4% access high- or very high-level institutional financing. Public funding and strategic location act as signals that reduce uncertainty and entry barriers for inexperienced entrepreneurs (Berliner et al., 2025; Kato, 2025). The team structure, largely three partners, compensates for experience gaps through diverse skills and knowledge, aiding obstacle navigation and access to networks (Schmidt et al., 2024). Taken together, under high uncertainty, the combination of public policies, territorial proximity, and heterogeneous teams facilitates survival and growth for startups that do not yet have an established track record.

Cluster 3 comprises small firms led by individuals with substantial experience and advanced education (including postgraduate degrees), distributed mainly in the metropolitan area and the north and south regions. Survival is ~50%, indicating long-term market presence. Key resilience drivers are prior experience, education level, number of partners, and leader age. Women lead 20% of these firms, signaling persistent barriers to female participation in high-experience, resource-rich profiles. Literature notes ongoing gender inequalities in access to resources for innovative ventures, affecting women's participation and growth (Kanze et al., 2017; Brush et al., 2017). This profile shows human capital—especially experience and training—crucial for survival in resource-constrained contexts, and the lower female participation confirms enduring structural inequalities in the entrepreneurial ecosystem.

These clusters reveal the heterogeneity of the ecosystem and suggest that leadership characteristics and access to resources are grouped in ways that differentially impact survival and are correlated with gender distribution.

4.4. Evaluation of an acceleration program in Chile

The impact of an acceleration program in Chile was evaluated in a sample of 26 participants in the pre-test and 21 in the post-test. The measurement focused on entrepreneurial skills and self-confidence, using questionnaires administered before and after the intervention.

Changes in entrepreneurial skills and self-confidence

The results show significant improvements in both variables:

Entrepreneurial skills:
The mean in the pre-test was 3.50 (SD = 0.70), while in the post-test it was 4.20 (SD = 0.60). The difference was statistically significant, $t(19) = 7.85$, $p < 0.001$.

Self-confidence:
The mean in the pre-test was 3.70 (SD = 0.80), increasing to 4.50 (SD = 0.50) in the post-test, with a significant difference, $t(19) = 9.12$, $p < 0.001$.

These results (Table IV) indicate that the program significantly strengthened the participants' skills and confidence.

[TABLE IV NEAR HERE]

Perception of Positive Changes (Qualitative Analysis): Content analysis of the open-ended responses from the post-test reinforced the quantitative findings. Recurring themes included: "strengthening support networks," "access to specialized mentoring," "clarification of the business model," "increased confidence in presenting projects to investors," and "development of resilience in the face of challenges." Several participants highlighted how the community provided them with tools and a safe space to address the specific challenges they face as women in the cleantech sector. One participant commented: *"The community not only gave me technical knowledge, but also the confidence to believe that I can lead my venture in a male-dominated sector."*

5. DISCUSSION

This study has addressed the complex interaction of factors that influence the survival of Chilean cleantech ventures, with a particular emphasis on the role of gender in leadership and the effectiveness of support interventions. The findings offer a multifaceted contribution to the literature on female entrepreneurship, business dynamics in impact sectors, and the effectiveness of Communities of Practice (CoP) in emerging economies.

5.1. Synthesis and Interpretation of Key Findings

Our results reveal a persistent gender disparity in the survival of Chilean cleantech ventures. Women-led companies have lower survival probability; this is supported by Figure

1 and Log-Rank tests, with a Hazard Ratio of 1.62 in the cure-fraction survival model, indicating a higher cessation risk for female-led ventures even after controlling for other variables. This aligns with literature on systemic barriers to capital, networks, and legitimacy (Kanze et al., 2017; Coleman, 2007; Goncalves et al., 2025). The cure-fraction approach was crucial to reveal heterogeneity in cessation risk, distinguishing an inherently resilient (immune) fraction from more vulnerable cases. The gender disadvantage is amplified in the most fragile segment, where limited experience and financing (Table II) exacerbate fragility.

Cluster analysis (Table III) complements the above interpretation by revealing the structural heterogeneity of the Chilean cleantech ecosystem and how gender intertwines with human, social, and financial capital to define risk and opportunity profiles. Three clusters were identified: Cluster 1—Entrepreneurs with Emerging Trajectories and Development Capital—composed of young entrepreneurs (35±5 years old) with no previous work or entrepreneurial experience, who lead large teams and have undergraduate education; located mainly in southern Chile, they operate with moderate technology and show average financing; this cluster accounts for 35% of women among the three leaders and has a survival rate of 48%. Cluster 2 — Entrepreneurs with Greater Access to Financing and Regionally Concentrated — with a majority of young leaders (60% between 30 and 42 years old) and a high proportion without experience (84.9%), mainly in the Metropolitan Region (94.3%), with access to high institutional financing (60.4% in high or very high categories) and teams mostly consisting of three partners; their survival rate is the highest, at 67%. Cluster 3 — Highly Experienced Entrepreneurs with Limited Resources— consists of small companies led by individuals with relevant work experience and higher education (including postgraduate degrees), distributed across several regions; their survival rate is close to 50%, and the proportion led by women is 20%, which highlights obstacles to greater female participation in profiles with greater experience and resources. Together, these clusters confirm the usefulness of Resource-Based View (RBV) in understanding the “triple resource gap” (human, social, and financial capital) as a configurator of risks and opportunities, and show that the gender of the leader is associated with these gaps to generate differentiated risk profiles. These differences suggest the need for differentiated interventions that strengthen communities of practice and support networks, especially for Cluster 3, where gender gaps are most pronounced, with policies and programs that promote mentoring, network

development, and psychosocial capital strengthening to improve ecosystem persistence and performance.

Despite these disparities, the quasi-experimental evaluation of an acceleration program in Chile (Table IV) offers an encouraging perspective on the potential of targeted interventions. The significant increase in entrepreneurial skills and self-confidence among participants post-intervention ($p < 0.001$) demonstrates that structured, CoP-centered programs can actively mitigate some of the gender barriers. The high ratings for "Module Quality" and "Networking and Networks" (4.6 and 4.7, respectively) underscore the importance of peer-to-peer learning and social capital building. These results are in line with psychological capital theory (Luthans *et al*., 2007), which posits that self-efficacy and resilience can be developed, thus mediating the impact of institutional support on entrepreneurial behavior (Bandura, 1997). Qualitative analysis of open-ended responses reinforces that networking and experience sharing are crucial elements.

5.2. Theoretical and Empirical Contribution

Theoretically, this study extends the Resource-Based View (RBV) to female entrepreneurship in high-impact sectors by integrating a cure-fraction model that distinguishes between inherently resilient ventures and those prone to failure. This approach clarifies how human, social, and financial capital interact with gender biases to shape survival, reinforcing the view that internal resources, when coordinated with networks and public policies, can yield sustainable competitive advantages in contexts of structural scarcity (Barney, 1991; Wernerfelt, 1984; Brush et al., 2018). Psych capital (self-efficacy, resilience, optimism) is incorporated as a mediator between institutional support and entrepreneurial behaviors, linking RBV with dynamic capabilities and explaining why interventions like Communities of Practice (CoP) strengthen both performance and long-term persistence (Luthans et al., 2007; Bandura, 1997; Teece, 2007). A gender-cluster analysis provides a typology that captures intersections among gender and capital types, guiding more precise interventions (Brush et al., 2018; Hebert, 2025; Kanze et al., 2017).

Empirically, findings show that CoP enhances entrepreneurial skills and self-confidence among women in cleantech, modulating strategic behaviors. The cure fraction indicates that within the susceptible subset, female leadership is linked to higher cessation

risk (HR ≈ 1.45, $p < 0.01$), while increases in financing, experience, and education reduce risk ($p < 0.05$). Cluster 3 (low social capital) has the lowest survival (39%), underscoring persistent triple-resource gaps; clusters with more funding and experience show better persistence (Cluster 2). Policy-wise, CORFO signals quality, enhances legitimacy, and improves network access, strengthening social and psychological capital and boosting CoP effectiveness in emerging economies. Overall, designs should combine mentoring, network development, and psychosocial capacity-building to foster a more equitable and robust ecosystem.

5.3. Implications for Policy and Practice

The findings have clear implications for the design of public policies and support programs:

Designing Targeted Programs: It is essential that incubators, accelerators, and investment funds recognize and proactively address the structural disadvantages faced by women, especially those in early stages or with less access to networks (Cluster 3). Programs must go beyond pure financing, including robust components of mentoring, network development, and psychosocial skills strengthening.

Strengthening Social Capital: The high value placed on "Networking and Networks" in an acceleration program in Chile underscores the need to create and maintain active communities of practice, facilitating meaningful connections and access to "power nodes" (investors, sector experts, policy makers) for women entrepreneurs.

Education and Human Capital: The influence of educational level and entrepreneurial experience on survival (Table II) highlights the importance of training programs that compensate for these gaps, especially in management, financing, and strategy skills.

Awareness and Bias Reduction: Policymakers should promote awareness of gender bias in the entrepreneurial ecosystem, especially in project evaluation and funding allocation processes, to ensure a more level playing field.

Visibility and Role Models: Highlighting success stories of women in cleantech, such as

those emerging from an acceleration program in Chile, can inspire new female entrepreneurs and counteract the "erosion of self-efficacy" through vicarious modeling (Bandura, 1997).

5.4. Study Limitations

The Chilean cleantech sample, while representative nationally, may limit generalization to other geographic contexts or sectors. The gender imbalance in the survival sample (74.1% men vs. 25.9% women) could influence the significance of some variables in traditional Cox models, prompting the use of a cure-fraction approach. Measures of entrepreneurial skills and self-confidence were based on self-reports (pre–post), introducing potential social-desirability bias. Although the quasi-experimental design mitigates several threats to internal validity, the absence of a randomized control group remains an inherent limitation.

6. CONCLUSIONS

This study has provided a robust and multifaceted analysis of the survival of Chilean cleantech ventures, with a specific focus on the influence of leadership gender and the impact of support programs. The results confirm the persistence of significant gender disparities in the entrepreneurial ecosystem, while offering valuable insights into strategies for mitigating these gaps.

First, our findings strongly reveal a **lower probability of survival for ventures led by women** in the Chilean cleantech sector. The application of a novel **survival model with cure fraction** was instrumental in revealing that this gender disadvantage is accentuated in the most susceptible segment of the venture population, where women leaders face a significantly higher risk of cessation of operations (Hazard Ratio of 1.62) compared to their male counterparts. This underscores the existence of systemic barriers that impact female resilience, corroborating existing literature on the difficulties entrepreneurs face in accessing capital, networks, and legitimacy (Coleman, 2007; Kanze et al., 2017; Ewens & Townsend, 2019).

Second, cluster analysis reveals heterogeneity in the Chilean cleantech ecosystem and how gender intersects with available capital. Three profiles were identified: Cluster 1, with young leaders and limited experience, intermediate survival; Cluster 2, with greater financing

access and regional concentration, the highest survival; Cluster 3, high experience but low social and financial capital, the lowest survival. These findings align with the Resource-Based View (RBV): the triple resource gap (human, social, financial) translates into distinct risks and underscores the need for targeted interventions (Communities of Practice, mentoring, and access to funds) for the most vulnerable, while better-supported environments enable greater persistence. Together, clusters inform strategies to strengthen resilience and permanence in the Chilean cleantech ecosystem.

Third, the quasi-experimental evaluation of an acceleration program in Chile offered a ray of hope and a model for effective intervention. Participation in this Community of Practice resulted in a significant increase in the entrepreneurial skills and self-confidence of women leaders. This empirical result is crucial, as it demonstrates the ability of well-designed interventions to strengthen the psychological capital of women entrepreneurs (Luthans et al., 2007) and to build social capital through networking and peer learning, which are vital elements for persistence and success in a challenging environment (Bandura, 1997; Daskalopoulou et al., 2023).

This study contributes theoretically and empirically to the field of female entrepreneurship by (1) integrating the survival-with-cure model with RBV, offering a more granular perspective on gender disparities in the risk of cessation; (2) providing a gender-based typology of cleantech ventures that highlights the intersectionality of resources and risk; and (3) validating the effectiveness of Communities of Practice in improving the human and psychological capital of female entrepreneurs in an emerging economy context.

The practical implications are clear: public policies and support programs must go beyond traditional financing. It is imperative to develop comprehensive h programs that strengthen social capital, self-efficacy, and specific management skills for women entrepreneurs, especially those in early stages or with limited networks. Fostering communities of practice and providing specialized mentoring can be a key catalyst for leveling the playing field and unleashing female entrepreneurial potential in critical sectors such as cleantech.

In summary, while gender disparities in venture survival persist, this study demonstrates that strategic and focused interventions can empower women entrepreneurs, equipping them with the tools and confidence necessary to build resilient and successful

businesses. The path to a more equitable entrepreneurial ecosystem requires an ongoing commitment to research that reveals the underlying causes of disparity and to the design of innovative solutions that promote inclusion and sustainable growth.

AUTHOR CONTRIBUTIONS

- Beatriz Millán: Conceptualization (lead); Methodology (lead); Data curation (lead); Formal analysis (lead); Investigation (lead); Visualization (lead); Writing – original draft (lead); Writing – review & editing (lead); Project administration (lead).
- Katherina Kuschel: Conceptualization (lead); Methodology (lead); Investigation (lead); Resources (equal); Data curation (lead); Supervision (lead); Project administration (equal); Writing – original draft (equal); Writing – review & editing (equal).
- Carla Bustamante: Conceptualization (equal); Methodology (equal); Investigation (supporting); Supervision (supporting); Writing – review & editing (supporting).
- Juan Antonio Carrasco: Methodology (supporting); Formal analysis (equal); Supervision (supporting); Writing – review & editing (equal).

This article was developed as part of Beatriz Millán's doctoral research. Beatriz Millán and Katherina Kuschel made the main intellectual, methodological, and writing contributions to the manuscript. Beatriz Millán led the formulation of the research problem, the empirical strategy, the organization of the quantitative data, the formal analysis, the interpretation of the results, and the preparation of the manuscript. Katherina Kuschel played a central role in the conceptual development of the study, the methodological refinement, the organization of the data, and the application of the research instrument. She also led the supervision of the research process and the critical review of the manuscript, particularly in the areas of women's entrepreneurship, cleantech ventures, resilience, and Communities of Practice.

The remaining co-authors contributed through specific conceptual, methodological, analytical, supervisory, and resource-related inputs, as detailed in the CRediT author contribution statement.

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The datasets generated and analyzed during the current study are not publicly available because the Corfo database is not public due to information related to individualized persons, but they are available upon reasonable request from the corresponding author.

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Table I. Independent Variables for Business Survival Analysis

Variable	Code	Type	Scale / Values	Description/ Notes
Gender of Leader	Gender_Leader	Categorical (binary)	1 = Male; 0 = Female	Main predictor of survival
Leader's Age	Age_Leader	Continuous	Years at start	
Leader's Educational Level	Education_Level	Categorical	Postgraduate, Undergraduate, Secondary/Technical	Secondary/Technical showed influence
Leader's Work Experience	Work_Experience	Continuous	Years of experience	
Leader's Entrepreneurial Experience	Entrepreneurial_Experience	Binary	1 = with experience; 0 = without experience	
Funding Amount	Funding_Amount	Continuous (log)	CLP, log-transformed	
Business Model	Business_Model	Categorical	1 = Service; 0 = Technology	
Number of Partners	Number_Partners	Discrete	Count of main partners	
Count of Women in the Team	Women_in_Team	Discrete	Count of women among the three members	
Region of Origin	Region	Categorical	North, Center, South	

Source: Table by authors.

Table II. Results of the Survival Model with Cure Fraction. Source: Own elaboration

Variable	Hazard Ratio (HR)	Lower 95% CI	95% CI Upper	p-value
Gender of leader (Female vs. Male)	1.62	1.23	2.12	0.001
Educational level (Secondary/Technical vs. Postgraduate)	2.05	1.55	2.71	<0.001 ***
Amount of funding (log)	0.78	0.66	0.92	0.005 **

Source: Table by authors.

Table III. Characteristics of Cleantech Startup Clusters. Source: Own elaboration

Characteristic	Cluster 1 (Young entrepreneurs)	Cluster 2 (Greater financing)	Cluster 3 (High experienced)
N (number of companies)	62	78	45
Percentage of female leaders	22	17	20
Average age of leader (years)	36 ± 5	49 ± 6	43 ± 7
Average funding (millions of CLP)	18	32	14
Survival rate (%)	51	67	39

Source: Table by authors.

Table IV. Acceleration Program Assessment. Source: Own elaboration

Variable	Pre-test mean (SD)	Post-test mean (SD)	t (gl=20)	p-value
Entrepreneurial skills	3.50 (0.70)	4.20 (0.60)	7.85	<0.001
Self-confidence	3.70 (0.80)	4.50 (0.50)	9.12	<0.001

Source: Table by authors.

CAPÍTULO 4
Contribución

La contribución de esta investigación no se limita únicamente en documentar diferencias en las tasas de supervivencia entre empresas lideradas por mujeres y por hombres, sino que avanza hacia una explicación más profunda de los mecanismos que generan dichas diferencias en economías emergentes. En este sentido, el valor del estudio radica en transitar desde un enfoque descriptivo hacia una comprensión multidimensional de la supervivencia empresarial, donde el género deja de concebirse como un atributo individual aislado y pasa a entenderse como una dimensión relacional que interactúa con la dotación de recursos, el apoyo institucional, las características sectoriales y las capacidades psicosociales de quienes emprenden.

La investigación, aporta una mirada integrada de la supervivencia empresarial en economías emergentes que vincula género, recursos estratégicos, política pública y resiliencia emprendedora. Su principal contribución radica en demostrar que las trayectorias de permanencia o salida del mercado de una empresa liderada por mujeres no depende exclusivamente de sus capacidades internas ni de la gestión de sus recursos, sino de la forma en que tales capacidades se construyen, alcanzan la legitimidad y adquieren valor en contextos sectoriales e institucionales específicos.

Finalmente, existe la contribución hacia la política pública y la gestión del ecosistema emprendedor. La evidencia a través de los análisis realizados permite formular definiciones claras para el diseño de instrumentos de política pública y para la gestión de organizaciones que apoyan al emprendimiento, como incubadoras y aceleradoras. No es solo la entrega de recursos, sino que también acceso a redes, servicios empresariales y mentorías, que permite sostener que las políticas deben estar orientadas según etapa, sector y perfil de recursos que necesita la empresa.

En conjunto, estos hallazgos contribuyen a la teoría al demostrar que el género no opera como un determinante directo de la supervivencia empresarial, sino como una dimensión relacional que expresa configuraciones diferenciadas de acceso, combinación y valorización de recursos, cuya efectividad depende del contexto sectorial e institucional en el que se insertan las empresas.

CAPÍTULO 5

Conclusiones y Limitaciones

La presente tesis doctoral que se articula a través de sus dos investigaciones conjuntas permite sostener que la supervivencia empresarial en economías emergentes no es un resultado lineal. Por el contrario, emerge como un proceso relacional en el que confluyen la dotación de recursos estratégicos, la forma en que dichos recursos se valorizan y se gestionan, la influencia de la política pública con sus mecanismos de apoyo al emprendimiento, y las condiciones del sector productivo donde la empresa desea posicionarse. Es por ello, que este estudio propone que el género no es solo un rasgo demográfico del fundador, sino que es una dimensión que condiciona el acceso a recursos como capital financiero, social, humano y psicológico bajo contextos institucionales y sectoriales definidos; y los gestiona.

Una de las conclusiones centrales de la tesis, es que la relación entre género y supervivencia empresarial no es uniforme entre contextos, y precisamente en esa variación reside uno de los hallazgos más significativos de la investigación.

Dicho de otro modo, la investigación evidencia que no hay una ventaja ni una desventaja intrínseca vinculada al liderazgo femenino; lo que existe son configuraciones diferenciadas de recursos y oportunidades, cuya efectividad depende del tipo de industria, del capital requerido, del grado de especialización técnica exigido y del ecosistema institucional en el que la empresa intenta sostenerse.

Por lo tanto, el género no debe ser leído como una variable independiente que, por sí sola, explique el desenlace empresarial, sino como una dimensión que interactúa con estructuras de recursos. La evidencia integrada de la tesis muestra que las desigualdades observadas en supervivencia no se originan únicamente en decisiones individuales, sino en brechas de capital financiero, social, humano y psicológico. En el caso de las startups de alto crecimiento, el financiamiento público y el entorno de apoyo parecen compensar parcialmente esas brechas, permitiendo que las empresas lideradas por mujeres conviertan recursos en trayectorias más estables. En cleantech, en cambio, allí donde las exigencias tecnológicas, regulatorias y de redes especializadas son mayores, esas brechas reaparecen con más fuerza y se traducen en una vulnerabilidad más marcada del segmento susceptible al cierre. En este sentido, la tesis avanza desde la descripción de diferencias entre hombres y

mujeres hacia una explicación estructural de las condiciones bajo las cuales esas diferencias se producen, se moderan o se intensifican.

Otra de las principales conclusiones, es que el financiamiento público sí influye en la sobrevivencia de las empresas de alto crecimiento, pero que su influencia no es solo recursos monetarios, sino que un apoyo estatal estratégico que reduce la vulnerabilidad inicial de los emprendimientos.

A la luz de lo anterior, otra conclusión relevante de esta investigación se refiere al papel de la política pública. Los resultados muestran que la efectividad del apoyo estatal depende de su capacidad para responder a estructuras de desigualdad y a requerimientos sectoriales específicos. En sectores de alto crecimiento, el financiamiento público puede constituir una plataforma eficaz para sostener trayectorias lideradas por mujeres; en cleantech, en cambio, el financiamiento por sí solo resulta insuficiente si no se acompaña de mentoría especializada, acceso a redes técnicas y comerciales, fortalecimiento del capital psicológico y dispositivos institucionales que mitiguen sesgos de legitimidad. La tesis concluye, por ello, que las políticas orientadas a la supervivencia empresarial deben ser integrales, segmentadas y explícitamente sensibles a la interacción entre género, tipo de industria y estructura de recursos.

Desde el punto de vista metodológico. La combinación de modelos de Cox, análisis de supervivencia con fracción de cura, análisis de clúster y evaluación cuasi-experimental no solo fortalece la robustez empírica del estudio, sino que permite observar dimensiones distintas del fenómeno que, analizadas por separado, habrían permanecido parcialmente invisibles. El modelo con fracción de cura aplicado en cleantech fue particularmente decisivo porque permitió distinguir entre una fracción de empresas inherentemente resilientes y otra más expuesta al cese. Esa distinción no es menor: implica reconocer que el riesgo de fracaso no se distribuye homogéneamente dentro del universo emprendedor y que, por lo mismo, los efectos del género, del financiamiento, de la educación o de la experiencia previa deben interpretarse dentro de esa heterogeneidad. La investigación, por tanto, no solo aporta resultados sustantivos, sino también una estrategia analítica pertinente para estudiar supervivencia empresarial en contextos complejos y desiguales.

En esa misma línea, el análisis de clúster del estudio cleantech permite concluir que el ecosistema emprendedor no es una estructura uniforme, sino un espacio estratificado en

perfiles de recursos, trayectorias y vulnerabilidades.

El estudio identifica tres grupos diferenciados: uno de trayectorias emergentes con desarrollo inicial, otro con mayor acceso a financiamiento y concentración regional, y un tercero caracterizado por mayor experiencia, pero con restricciones de capital social y financiero. El clúster con mayor acceso a financiamiento exhibe la más alta supervivencia, mientras que el grupo con menor capital social registra la tasa más baja, de 39%. La relevancia de este hallazgo radica en que desplaza la explicación desde la empresa individual hacia la configuración de recursos que la rodea. No todas las firmas fracasan o sobreviven por las mismas razones; algunas lo hacen porque carecen de financiamiento suficiente, otras porque no acceden a redes de apoyo, otras porque su experiencia previa no logra convertirse en legitimidad sectorial. La supervivencia, entonces, no es un atributo de la empresa aislada, sino una relación entre la empresa, la gestión de sus recursos y su posición dentro del ecosistema.

Particularmente valiosa para la originalidad de la tesis, es que el capital psicológico debe ser incorporado como una dimensión analítica relevante en el estudio de la supervivencia emprendedora. El segundo estudio muestra que una comunidad de práctica y un programa de aceleración generan mejoras estadísticamente significativas en habilidades emprendedoras y autoconfianza. Más allá del resultado puntual, este hallazgo tiene implicancias mayores: sugiere que los recursos estratégicos no se limitan en capital financiero, experiencia laboral o redes, sino que incluyen disposiciones subjetivas que influyen sobre la persistencia, la adaptación y la acción estratégica bajo incertidumbre. La tesis introduce así una expansión relevante de la teoría de los recursos (RBV), al conectar los recursos organizacionales con mecanismos psicosociales que median la capacidad de sostener la empresa en entornos adversos. Entonces el capital psicológico no aparece como un elemento adicional, sino como un recurso que puede fortalecerse institucionalmente y que, al hacerlo, modifica la relación entre apoyo externo y comportamiento emprendedor.

En términos más amplios, esta investigación permite concluir que la supervivencia empresarial en economías emergentes debe estudiarse como una dinámica de diferentes escalas. En el nivel micro, importan la experiencia, la formación, la autoconfianza y las capacidades del liderazgo. En el nivel meso, resultan decisivos el acceso a redes, la densidad relacional del ecosistema y los mecanismos de validación institucional. En el nivel macro,

inciden la política pública, la estructura sectorial y las condiciones de financiamiento. El género atraviesa esos tres niveles, no como una variable demográfica persé, sino como un principio de diferenciación en la distribución y conversión de recursos. Esta es, en rigor, la principal conclusión sustantiva de la tesis: la supervivencia no depende solamente de la cantidad de recursos que posee una empresa, sino de si ese recurso puede ser activado, reconocido y transformado en ventaja organizacional dentro de un contexto que no distribuye las oportunidades de manera neutral.

Limitaciones del estudio

Como toda investigación doctoral que trabaja con problemas complejos, esta tesis presenta limitaciones que no invalidan sus hallazgos, pero sí delimitan su alcance interpretativo y orientan futuras líneas de investigación. La primera limitación se vincula con el contexto empírico. Ambos estudios se desarrollan en Chile, lo que constituye una fortaleza analítica por tratarse de un caso relevante dentro de las economías emergentes, pero al mismo tiempo restringe la generalización directa de los resultados a otros países. El entorno regulatorio chileno, el diseño específico de los instrumentos Corfo y la configuración de su ecosistema emprendedor poseen rasgos institucionales propios; por ello, la extrapolación de los hallazgos debe hacerse con cautela y de manera analítica, no por simple analogía. Esta restricción se reconoce de manera explícita tanto en el artículo sobre startups de alto crecimiento como en el estudio cleantech.

Una segunda limitación deriva de la naturaleza de las bases de datos utilizadas. En el primer estudio, la información agregada provista por Corfo y el SII permite identificar asociaciones robustas entre género, financiamiento y supervivencia, pero no posibilita observar en profundidad los mecanismos concretos a través de los cuales esas relaciones se producen. En otras palabras, el diseño permite establecer patrones consistentes, aunque no abre completamente la explicación de las prácticas estratégicas, de las interacciones con inversionistas, de la calidad específica de las redes o de los procesos organizacionales internos mediante los cuales las emprendedoras convierten recursos en permanencia. En ese sentido, no logra capturar exhaustivamente las mediaciones causales que estructuran dichas trayectorias.

Una tercera limitación se refiere a la operacionalización del género. En el primer artículo se reconoce explícitamente que la medición dicotómica hombre/mujer no captura la complejidad de la identidad de género ni las interacciones entre género y otras dimensiones como clase, edad o etnicidad. Esta observación es especialmente importante para una tesis que busca alejarse de interpretaciones simplificadas. En términos empíricos, el estudio se apoya en la información disponible principalmente en bases de datos; por ello, aunque el marco conceptual adopta una mirada más amplia del género, la medición cuantitativa necesariamente simplifica esa riqueza analítica. Entonces, los resultados deben interpretarse como evidencia sobre diferencias sistemáticas en trayectorias lideradas por mujeres y hombres dentro de las categorías disponibles, pero no como una captación de toda la complejidad de las desigualdades de género en el emprendimiento.

Una cuarta limitación tiene que ver con la composición de las muestras. En el estudio de startups de alto crecimiento, las empresas lideradas por mujeres representan una fracción minoritaria del total, y en el estudio cleantech también se observa un desequilibrio de género en la distribución de los casos. Si bien esta característica refleja la estructura real del ecosistema emprendedor analizado, también restringe la potencia de ciertas comparaciones y obliga a interpretar algunos resultados con prudencia. En el caso cleantech, precisamente esa heterogeneidad y desbalance contribuyen a justificar el uso del modelo con fracción de cura, el cual permite capturar mejor diferencias en una población donde no todas las firmas comparten el mismo riesgo basal. La limitación, por tanto, no invalida el análisis, pero recuerda que la desigual representación de mujeres en estos sectores es simultáneamente un dato del fenómeno y una restricción del diseño.

Otra limitación se relaciona con el alcance temporal y conceptual del indicador de supervivencia. En ambos estudios, la continuidad empresarial se aproxima a través de la permanencia operativa de la firma y de registros administrativos asociados al cese de actividad. Esta estrategia es adecuada para modelar duración y riesgo de salida, pero no permite distinguir con total precisión entre fracaso, reconversión, venta, fusión, pausa operativa o transformación del modelo de negocio. En otras palabras, la supervivencia observada remite a permanencia formal en operación, lo que constituye una medida sólida para el análisis de duración, aunque no equivale por sí misma a éxito, crecimiento o consolidación cualitativa del emprendimiento. Esta diferencia es crucial, porque una empresa

puede sobrevivir sin escalar, y otra puede dejar de operar sin que ello represente un fracaso en sentido estricto.

Otra limitación, particularmente relevante en el segundo estudio, concierne al diseño cuasi-experimental del programa de aceleración. Los resultados muestran mejoras significativas en habilidades emprendedoras y autoconfianza, pero el propio manuscrito reconoce que la ausencia de un grupo de control aleatorizado impide atribuir causalidad fuerte en el sentido experimental más estricto. Aunque el diseño pretest-postest mitiga varias amenazas a la validez interna y ofrece evidencia valiosa sobre cambio asociado a la intervención, no permite descartar por completo efectos de maduración, auto-selección o influencias contextuales concurrentes. De igual modo, las mediciones de habilidades y autoconfianza se basan en autorreporte, lo que introduce potencial sesgo de deseabilidad social. Esta limitación no disminuye la relevancia de los hallazgos; más bien, permite situarlos con precisión, en tanto muestran resultados consistentes respecto del fortalecimiento del capital psicológico, aunque aún susceptibles de ser contrastados mediante diseños comparativos más exigentes.

Una séptima limitación proviene del carácter predominantemente cuantitativo de la tesis. Aunque esta decisión metodológica resulta plenamente coherente con los objetivos de estimar riesgos, comparar trayectorias y modelar heterogeneidad de supervivencia, también deja fuera la posibilidad de reconstruir con mayor análisis interpretativo la experiencia vivida de las emprendedoras. Procesos como la negociación de legitimidad ante inversionistas, la percepción cotidiana del sesgo, la construcción de confianza en redes masculinizadas o la resignificación del fracaso empresarial aparecen inferidos en el análisis, pero no observados directamente a través de entrevistas, etnografía o seguimiento cualitativo longitudinal. Por ello, una agenda futura consiste en complementar esta investigación con diseños mixtos que permitan enlazar patrones estadísticos con narrativas, prácticas y mecanismos relacionales concretos. Esta proyección ya está insinuada en el propio artículo sobre startups de alto crecimiento, que propone avanzar hacia enfoques mixtos para comprender con más detalle las decisiones estratégicas y estilos de liderazgo que subyacen a la ventaja de supervivencia observada.

Y, por último, aun cuando la tesis incorpora distintas dimensiones de recursos, no logra identificar todas las posibles variables que podrían afectar la supervivencia. Factores

macroeconómicos, shocks regulatorios más finos, calidad de las redes comerciales, apoyo familiar, composición completa del equipo fundador, dinámicas de gobernanza interna o características más detalladas del modelo de negocio podrían incidir en las trayectorias observadas. La investigación logra capturar componentes centrales —financiamiento, experiencia, educación, localización, género, clústeres y capital psicológico—, pero no pretende haber cerrado definitivamente el universo de determinantes de la permanencia empresarial. En ese sentido, la tesis debe leerse como una contribución robusta y bien delimitada, no como una explicación completa del fenómeno.

Pese a estas limitaciones, la tesis ofrece una base empírica y analítica sólida para afirmar que la supervivencia empresarial en economías emergentes no puede comprenderse sin integrar simultáneamente recursos, instituciones, heterogeneidad sectorial y desigualdades de género. Su aporte principal no reside solo en mostrar que las empresas lideradas por mujeres pueden exhibir mejores trayectorias de supervivencia en ciertos contextos y mayor vulnerabilidad en otros, sino en explicar por qué esa diferencia cambia y en qué condiciones se produce. Con ello, la investigación desplaza el debate desde una pregunta descriptiva —si las mujeres sobreviven más o menos que los hombres— hacia una pregunta más integrada: cómo se configuran los mecanismos que hacen posible, limitan o interrumpen la permanencia empresarial en contextos marcados por escasez, incertidumbre y desigual distribución de recursos. Esa es, en último término, la contribución más sustantiva de esta tesis: haber mostrado que la supervivencia empresarial no constituye únicamente un resultado económico, sino un proceso condicionado por estructuras de oportunidad, acceso diferencial a recursos y mediaciones institucionales.

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