ESCUELA TÉCNICA DE INGENIERÍA (ICAI)

INGENIERO INDUSTRIAL

SUPPLY CHAIN RISK MANAGEMENT IN TEXTILE INDUSTRY

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Madrid

Abril 2018

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Delgado Blasco

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Supply Chain Risk Management in Textile Industry

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RESUMEN DEL PROYECTO

Introducción

Las demandas de los nuevos entornos de negocio y la progresión de los mercados emergentes están desarrollando redes de cadenas de suministro complejas y dinámicas (Braunscheidel y Suresh, 2009; Manuj y Mentzer, 2008; Tummala y Schoenherr, 2011; Spekman y Davis, 2004; Zsidisin et al., 2004) con numerosas actividades (logística, inventario, compras, producción, relaciones intra- and inter-organizativas y medidas de rendimiento). Consecuentemente, la complejidad y la implicación de numerosos suministradores conlleva un incremento en la exposición al riesgo para todos (Pfohl et al. 2010). Principalmente debido a las nuevas tecnologías y los ciclos de vida más cortos, el incremento de la demanda de entregas just-in-time, la reducción de buffers de inventario y al e-business (Brindley, 2004; Fawcett et al., 2011; Giunipero and Eltantawy, 2004; Hallikas et al., 2004; Harland et al., 2003; Narasimhan and Talluri, 2009).

Considerando la organización dinámica del mercado en cualquier industria de consideración, la industria textil y, en especial, la industria de ropa está constantemente evolucionando. En el pasado, las compañías de ropa preparaban sus productos meses antes de su lanzamiento. Hoy en día, esta industria está considerada una de las más dinámicas. La estrategia de **"fast fashion"** está debilitando empresas como Gap que está siendo destronada por H&M o Zara. El éxito de esta estrategia se debe a la constante renovación de ropa, extendiendo la oferta en número y tiempo. Lo que hace que funcione correctamente es una cadena de suministro flexible, capaz de adaptarse a cambios, reduciendo el tiempo de diseño y producción a semanas, en lugar de meses.

En este contexto, donde la demanda es altamente impredecible y el ciclo de vida de los productos es extremadamente corto, es esencial analizar los riesgos ligados a la cadena de suministro (Martino et al., 2017). Braithwaite and Hall (1999) hicieron énfasis en que la relación entre la estrategia corporativa, los riegos y las implicaciones para la gestión de la cadena de suministro están pobremente comprendidas y necesitan ser estudiadas más detalladamente (Jüttner, 2003). Hay cuatro tipos de mitigaciones teniendo en cuenta el número de empresas involucradas en la estrategia y cómo afectan a la cadena de suministro en sí: **"Enterprise to enterprise"** (utilizada para mitigar riesgos internos y que no tiene ventajas para otros miembros de la cadena de suministro), "**Enterprise to supply chain"** (utilizada para mitigar riesgos internos y que sí tiene ventajas para otros miembros de la cadena de suministro), "**Supply chain to supply chain passive"** (al menos dos empresas en la cadena de suministro está involucradas y hay ventajas para las dos compañías, pero una de ellas tiene un rol proactivo mientras que la otra pasivo) y "**Supply chain to supply chain cooperative"** (al menos dos empresas de la cadena de suministro están involucradas, tiene ventajas para ambas y ambas están activamente implicadas).

Este estudio se centrará en mitigaciones de riesgos que son clasificadas como "Supply chain to supply chain", estudiando más en detalle "Supply chain to supply chain passive". Norrman y Janssen (2008), al igual que Tang (2006), hicieron énfasis en la colaboración entre empresas Giunipero y Eltantawy (2004) argumentaron que la gestión de la cadena de suministro tiene que tener una visión a largo plazo y tener un planteamiento continuo, requiriendo dedicación de todos los miembros de la cadena de suministro. Pesa a que la colaboración era algo considerado hace mucho tiempo, es un estudio exigente, ya que dos-tercios de las mitigaciones implementadas actualmente suelen ser de los tipos "Enterprise to Enterprise" o "Enterprise to supply chain". Cuando dos compañías se deben coordinar y colaborar, pueden surgir problemas que provocan que estas mitigaciones sean complicadas de implementar con éxito. La relación entre dos compañías debe ser beneficial para ambas, reforzando el rendimiento y mejorando los ingresos. En muchos casos, los beneficios pueden ser más considerable para una compañía que para otra, causando un conflicto entre ellas. Esto ocurre normalmente cuando una compañía es una empresa dominante en la cadena de suministro – tiene poder para influir en las decisiones de otros miembros. Las nuevas olas de innovación y gestión empresarial deben impulsar la idea de redes abiertas, no mercados cerrados como ocurría en el pasado. Las compañías deben centrarse en colaboraciones y no en competiciones como antes.

La evolución dinámica de la estructura de las cadenas de suministro implica muchos desafíos interesantes para un sistema efectivo de coordinación: las cadenas de suministro no pueden competir como miembros independientes. El producto utilizado por el cliente final pasa por un gran número de entidades que contribuyen al valor añadido antes de su consumo. No obstante, el hecho de que exista una empresa dominante no puede ignorarse (Gupta, 2009) y especialmente considerando el caso de estudio: "Supply chain to supply chain mitigations (passive and cooperative)". El hecho de que exista una empresa dominante en la cadena de suministro hace que las mitigaciones pasivas sean posibles: las empresas no dominantes optimizaran sus objetivos bajo las restricciones impuestas por la empresa dominante incluso cuando la optimización individual no sea eficiente para la cadena de suministro completa (Gupta, 2009). En todas las cadenas de suministro, las compañías principales actúan creando valor para el cliente final. Considerando el rol de cada empresa, las probabilidades de ser la empresa dominante varían. Obteniendo conclusiones del estudio de Gupta y Singh, el actor principal es el cliente. Toda la cadena de suministro debe estar diseñada para cumplir sus necesidades. Como es un actor impredecible e imposible de gestionar, el siguiente actor al final de la cadena de suministro es normalmente considerado el actor dominante: minoristas. Debido a la cercanía con el cliente y considerando que su objetivo final es cumplir con los deseos de este, es lógico considerar que suelen ser la empresa dominante con mayor probabilidad que otros en la cadena. Otros miembros aguas arriba como distribuidores o fabricantes pueden ser la empresa dominante en ciertas cadenas de suministro.

La industria textil es una industria clave para estudiar riesgos y mitigaciones en cadenas de suministro flexibles donde la innovación está a la orden del día y nuevas estrategias están siendo constantemente introducidas. Considerando que este proyecto es en colaboración con el Politecnico di Milano, la industria textil estudiada será la italiana. Los productos textiles italianos son conocidos mundialmente. Pese a que Italia es un país rico y desarrollado, está intensamente especializado en productos industriales customizados y que siguen las tendencias. Es un sistema productivo basado en PYMEs. Aunque la competencia de nuevos países industrializados va in crescendo, la industrial textil italiana continúa siendo una parte relevante para la economía doméstica del país – casi 3% del PBI italiano. Muchos estudios atribuyen este hecho a su enfoque en la *calidad* de los productos. Es una ventaja competitiva que provoca que otras compañías europeas elijan los productos "Made in Italy" frente a los "Made in China". Calidad sumada al hecho de que Italia es un país más cercano que hace que los costes y el tiempo de envío se reduzcan considerablemente (para cumplir los requerimientos del "fast fashion"), hace que sea un mercado más atractivo para las compañías europeas.

Por otra parte, Italia está sufriendo últimamente una gran amenaza: miles de chinos están comprando locales baratos de empresas italianas que estaban en bancarrota y se están asentando en un área de fábricas en Prato, Toscana. Actualmente, casi 4.000 fábricas controladas por chinos están produciendo un millón de prendas al día. Los principales factores para su éxito son: productos de bajo precio, producción masiva y el hecho de que consiguen un ritmo elevado de producción cumpliendo el "fast fashion". Esto, sumado a la crisis económica que han hecho que diversas empresas cierren en la última década, puede explicar la tendencia italiana actual: comparando la media de la producción de industria textil en Italia con la media de demás países europeos, es decreciente.

Metodología

Este documento se centrará en Calzedonia (calcetines) and Intimissimi (ropa interior y seda – lana). Ambas se pueden considerar las empresas dominantes en sus cadenas de suministro. Pese a que ambas pertenecen al grupo Calzedonia Agrupar, se pueden considerar competidores indirectos, ya que operan en el mismo segmento y tienen el mismo mercado objetivo. Sus datos pueden ejemplificar una típica cadena de suministro europea. Los resultados del análisis pueden extenderse a otras empresas textiles en Europa y pueden otorgar unas guías para investigaciones futuras.

Se utiliza el método de investigación de **Sampieri** (Sampieri, 1991). Se basa en **nueve pasos** cuando el problema es cualitativo: *Idea, Planteamiento del problema, Inmersión inicial en el tema de estudio, Concepción del diseño del estudio, Definición de la muestra del estudio inicial and acceso a ella, Obtención de datos, Análisis de datos, Interpretación de los resultados* y *Conclusiones y elaboración del informe final.*

El marco de investigación final es una mezcla de esquemas y clasificaciones de diferentes autores. El marco de investigación propuesto es estructuralmente igual que Musa

propuso en su disertación (2012), basado en flujos (que proporcionan las conexiones entre diferentes compañías). Dittman ofrece una clasificación para los riesgos basada en diferentes niveles y, en cambio, Brenchley realiza una clasificación basada en la bibliografía existente que serán ambas utilizadas para mostrar diferentes visiones de los riesgos a estudiar. Adicionalmente, Porter mide el cumplimiento de la estrategia y la conexión con las funciones de la empresa y Tang (2006) ofrece un marco de investigación para las estrategias de mitigación necesarias para las operaciones de la cadena de suministro.

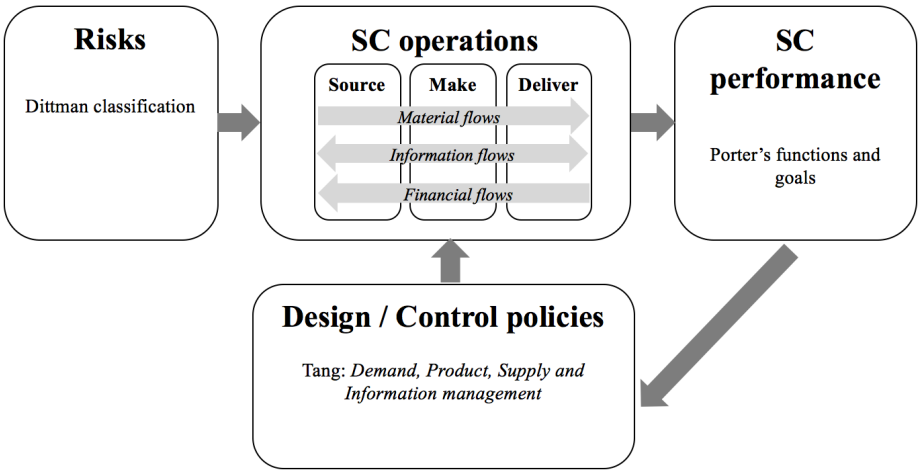

Figura 1: El marco de investigación final

El objetivo del estudio es ampliar la comprensión de las diferentes estrategias de mitigación donde dos firmas están involucradas. Además, se busca entender más profundamente los riegos y como los miembros están actuando en la cadena de suministro. El hecho de que un miembro asuma un rol dominante no debe ser ignorado (Gupta, 2009). Los miembros no dominantes optimizan sus objetivos bajo restricciones impuestas por el miembro dominante incluso cuando esa optimización no es eficiente para toda la cadena de suministro (Gupta, 2009). La otra dimensión considerada es cooperación y colaboración. La correlación entre las mitigaciones de interés y otras variables como el tamaño de la empresa, las funciones de la empresa o su fortaleza financiera será consideradas para observar donde está la generación de valor que estas estrategias pueden introducir a las diferentes compañías en la cadena de suministro. Finalmente, el objetivo final del estudio es generalizar el estudio a las empresas textiles europeas con recomendaciones y propuestas estratégicas. Con estos objetivos, se plantean las siguientes preguntas de investigación:

RQ1: *¿Cómo mitigan los riesgos de la cadena de suministro las empresas textiles?*

RQ2: *¿Cómo actúa el líder de una cadena de suministro? ¿Es lo suficientemente poderoso para influir en las decisiones del resto de compañías de la cadena de suministro?*

RQ3: *¿Cómo pueden las mitigaciones "Supply chain to supply chain passive" o "cooperative" mejorar la reputación, la posición financiera, el poder de mercado… de una compañía? (Beneficios de este tipo de mitigaciones de riesgos)*

RQ4: *¿En qué variables influyen las mitigaciones "Supply chain to supply chain mitigations"?*

RQ5: *Propuestas estratégicas para empresas textiles europeas basado en sus riesgos y estrategias de mitigación actuales.*

Resultados

Considerando los resultados del análisis, las mitigaciones y riesgos son **muy variados** en las cadenas de suministro estudiadas. No hay un riesgo o una estrategia de mitigación principal considerando la **ocurrencia** mientras que considerando la **exposición,** los riesgos principales son: *Detención de maquinaria; Práctica/gestión financiera; Inestabilidad política; Producto, proceso y diseño; Selección/outsourcing de proveedores* y *Sustitución*. Basado en los resultados mencionados, se realiza la siguiente proposición (para ser investigada en un estudio futuro):

Proposición 1: Propuesta de diferentes estrategias de mitigación para los riesgos con alta exposición

El ideal teórico de negocio es ser capaz de ponerse en una situación **donde ni clientes, empleados, competidores o proveedores pueden obtener valor de ti** mientras que en esa posición puedas **obtener valor de todos ellos**. Es importante reconocer que, si uno está en esa posición y asumiendo que sigue suministrando valor a los clientes, estaremos en una posición de poder sobre las relaciones de todos los miembros de la cadena de suministro (Cox, 1999). **Calzedonia y Intimissimi** son las compañías líderes creando valor en sus cadenas de suministro debido al "**brand power effect"**. Sin estos dos miembros, muchas de las otras compañías sufrirían de debilidad financiera debido al gran número de pedidos que ambas empresas generan, lo que hace que sean dependientes de estas firmas.

Además, hay **evidencias** de que **Intimissimi actúa con un rol dominante** en las cadenas de suministro. Casi la mitad de las mitigaciones son "Supply chain to supply chain", donde más de un 10% son estrategias pasivas. Procedimientos que implican colaboración y dominación reflejan el **poder de negociación** de la empresa. Intimissimi mitiga pasivamente sus riesgos con estrategias como *Selección de proveedores* o creación de *Relaciones a largo plazo.*

Calzedonia aplica mitigaciones "Supply chain to supply chain" en menos de un 40% de los casos. La **mayoría de los riesgos** a los que se enfrenta **no pueden ser mitigados forzando a otras empresas** a seguir ciertos procedimientos. Por ejemplo, el riesgo que suponen los costes de envío se mitiga con seguro de transporte, o los riesgos de envíos internacionales se mitigan construyendo un almacén para clasificar y enviar los productos. Ninguno de los dos afecta directamente a otras compañías de la cadena de suministro.

Se podría considerar que **Sandigliano** está actuando con un **rol dominante** sobre sus proveedores, considerando el alto número de **mitigaciones** "**Supply chain to supply chain"** que está aplicando. Otros hechos como el **verdadero poder** de esta compañía sobre otros miembros de la cadena de suministro conllevan que puede ser considerado un miembro importante pero **no dominante**. Es la compañía previa a Calzedonia en la cadena Calzedonia – calcetines. **El miembro dominante es Calzedonia, pero Sandigliano está actuando como tal**, ya que se enfrenta a un mayor número de riesgos y fuerza a Italfil a colaborar y mitigar alguno de sus riesgos.

Basado en estos resultados, se formulan las siguientes proposiciones para un futuro análisis:

Proposición 2: Medida del dominio de mercado de los miembros dominantes

Proposición 3: Análisis de las relaciones entre los diferentes miembros en la cadena de suministro

Proposición 4: Estudio que demuestre que la existencia del miembro dominante conlleva colaboración entre compañías en la cadena de suministro

Conclusiones

El análisis muestra la correlación entre el **tamaño de la empresa y el nivel IT** con las mitigaciones "**Supply chain to supply chain".** El **bajo nivel IT** conlleva más estrategias "Enterprise to enterprise" que los altos niveles. En estas compañías, sus mayores **riesgos** son **internos** debidos al nivel bajo de tecnología, lo que hace que gasten sus excedentes en mitigaciones para ellos mismos. Estas compañías **estarán menos dispuestas a colaborar** con otras si están sufriendo restricciones en sus operaciones. De hecho, no pueden ser obligadas a implantar mitigaciones pasivas, ya que no tienen flexibilidad y rapidez en la respuesta. Su prioridad es implantar más tecnología y, después, podrían contemplar otros tipos de mitigación. Esto no significa que sus estrategias no afecten otros miembros de la cadena de suministro – las mitigaciones "Enterprise to supply chain" son considerables en compañías con nivel bajo de IT. Por tanto, la colaboración y cooperación entre empresas crece con el nivel IT. Es una conclusión similar a la que llegó un estudio realizado por Baurau (2015). La relación con proveedores, clientes y otras unidades funcionales aumenta la creación de conocimiento, innovación y consecuentemente mejora el rendimiento de la cadena de suministro. Este descubrimiento es similar pero no está directamente relacionado con el estudio de Chen et al. (2013), quienes encontraron un efecto indirecto en la relación entre comunicación colaborativa y el rendimiento del cliente. La tecnología puede crear mejores plataformas para la interacción entre compañías, creando un ambiente óptimo para la colaboración y la relación entre empresas. **Las mejoras la tecnología de la información y la comunicación (TIC) promueven que las empresas compartan información** (Baihaqi et al.,2006). Cuando las compañías tienen un nivel alto de IT, normalmente también tienen fondos para grandes inversiones, lo que hace que sean perfectos candidatos para ser miembros dominantes.

Además, hay evidencias de una correlación entre el **tamaño** de la empresa y el **nivel IT.** Del Aguila-Obra et al. (2006) descubrieron que, contrariamente a lo que previos estudios sugerían, el tamaño de una compañía no tenía efectos en la disponibilidad de las tecnologías de Internet, pero tenía consecuencias en la gestión de la empresa. Cuanto más pequeña es una empresa, más posibilidades de utilizar consejo externo cuando adopta tecnologías de Internet, ya que las pequeñas empresas suelen tener menos capacidades administrativas. Mientras que la tecnología más sofisticada se identifica con las grandes empresas. **Si las grandes compañías estuvieran más abiertas a la tecnología**, las mismas conclusiones que antes podrían ser extraídas: las grandes empresas promueven la colaboración y tienen más poder en sus cadenas de suministro.

No hay una correlación clara entre otras variables de estudio (*Sustitución*, la existencia de *Información Compartida*) con estrategias "Supply chain to supply chain".

El análisis realizado no expuso ninguna correlación entre las mitigaciones de interés y la posición financiera o el poder de mercado. La falta de información crucial como algunos informes financieros, las relaciones entre las compañías o el mercado en Italia podría ampliar el análisis.

Basado en los resultados, se proponen las siguientes proposiciones:

Proposición 5: Medida de la correlación del nivel IT alto con el rol dominante en la cadena de suministro

Proposición 6: Medida de la correlación de las grandes empresas con el rol dominante en la cadena de suministro

Proposición 7: Análisis de posibles variables que tengan correlación con mitigaciones donde más de dos empresas estén involucradas

Proposición 8: Medida de la correlación del riesgo de sustitución con el rol dominante en la cadena de suministro

Proposición 9: Medida de la correlación de la existencia de información compartida con el rol dominante en la cadena de suministro

El análisis responde a la pregunta **RQ1: ¿Cómo mitigan los riesgos de la cadena de suministro las empresas textiles?** Los riesgos de mayor exposición son *Prácticas/gestión financiera* y *Disrupción operacional*. Considerando los riesgos encontrados (54), las mitigaciones más comunes (39) son *Relaciones a largo plazo*, *Planning a largo plazo* e *Información compartida*. Dos de estas estrategias implican a más de una compañía lo que lleva a la tercera pregunta analizada: **RQ3: ¿Cómo pueden las mitigaciones "Supply chain to supply chain passive" o "cooperative" mejorar la reputación, la posición financiera, el poder de mercado… de una compañía?** Las mitigaciones "Supply chain to supply chain" implican que más de una firma está colaborando o está siendo forzada a mitigar riesgos por otra. El análisis realizado no muestra ninguna correlación entre las mitigaciones donde dos o más firmas están involucradas y la posición financiera o el poder de mercado. Un análisis posterior donde la información disponible sea más relevante para el caso y que pueda ser utilizado para medir

mejor estas variables (ver las Proposiciones realizadas) – como informes financieros de cada compañía o variables financieras de la cadena de suministro que pueden aportar consistencia y fiabilidad a las conclusiones.

Siguiendo con la segunda pregunta **RQ2: ¿Cómo actúa el líder de una cadena de suministro? ¿Es lo suficientemente poderoso para influir en las decisiones del resto de compañías de la cadena de suministro?** Los miembros dominantes de las cadenas son Calzedonia e Intimissimi. Hay evidencias en el estudio que el riesgo de *Sustitución* fuerza a que las firmas mitiguen con *Diferenciación* o con *Innovación del producto*. Estas estrategias pueden mejorar el poder de mercado o la innovación de estas empresas. Pero también la presión que el miembro dominante ejerce sobre otras empresas puede motivar lo contrario, terminando con la quiebra de las empresas no dominantes – grandes inversiones y falta de permanencia en la cadena de suministro.

En las mitigaciones "Supply chain to supply chain passive" el *Contrato Pull* es el de mayor ocurrencia, lo que conlleva que algunas compañías tienen menos poder de negociación que otras. Los miembros influyentes están empujando su responsabilidad de inventario hacia atrás en la cadena de suministro, forzando a las compañías más débiles a asumir todo el riesgo. Esta estrategia solo beneficia a un socio en la cadena de suministro y, usualmente, causa detrimento a los demás.

La parte más importante del análisis se centra en la pregunta cuarta **RQ4: ¿En qué variables influyen las mitigaciones "Supply chain to supply chain mitigations"?** Hay evidencia que estas mitigaciones tienen correlación con el tamaño de la empresa y el nivel IT, como se ha explicado anteriormente.

Finalmente, se responde a la pregunta quinta **RQ5: Propuestas estratégicas para empresas textiles europeas basado en sus riesgos y estrategias de mitigación actuales** considerando el estudio de Porter. Como en las clasificaciones de Dittman y Musa, las operaciones en Porter también fueron las más afectadas por los riesgos. La estrategia "Fast fashion" juega un papel determinante en esta conclusión. Las operaciones deben ser flexibles y capaces de cumplir las órdenes en un periodo corto de tiempo. Si los riesgos están afectando a las operaciones, la compañía se debilita, por lo que la recomendación es:

Recomendación 1: Control exhaustivo cuando los riesgos son operaciones

Numerosos estudios revelan que la gestión de riesgos en la cadena de suministro mejora el rendimiento, como el estudio de Lavastre, Gunasekaran, & Spalanzani (2011).

Considerando la exposición al riesgos, Ventas y Marketing y Logística Interna son las áreas críticas en este caso. Los riesgos con la mayor exposición pertenecen a Ventas y Marketing y a Operaciones, y su ocurrencia también es elevada, lo que lleva a la segunda recomendación:

Recomendación 2: Mitigaciones colaborativas para riesgos con alta ocurrencia deben ser consideradas. En este caso, principalmente en Operaciones y Ventas y Marketing. Si las compañías de la misma cadena de suministro trabajan juntas contra

riesgos específicos, la efectividad de las mitigaciones será mayor que si lo hacen solas.

Este tipo de mitigaciones es usualmente menos caro que las mitigaciones "Enterprise to enterprise" – ya que otra firma está involucrada añadiendo sus medios– pero, al mismo tiempo, es más difícil de implementar porque es necesario colaboración o poder.

Con respecto a los objetivos de las empresas, el objetivo *Ventajas competitivas* es cooperativo, ya que para conseguir ventajas es necesario construir relaciones estables a largo plazo con otros miembros de la cadena – similar a la Recomendación 2. Por tanto, las mitigaciones "Supply chain to Supply chain" pueden ser consideradas habilitadoras de las *Ventajas competitivas* en estas cadenas de suministro – hay evidencia de la relación entre estas estrategias y el cumplimiento de los objetivos. Además, los objetivos *Líder de precios* y *Ventajas de costo* pueden ser considerados ventajas competitivas (*Precio/costo* en el estudio de Li et al.) generando las mismas conclusiones que antes – pese a que la ocurrencia de las mitigaciones "Supply chain to supply chain" se reduce en esos casos.

El objetivo de *Nuevo producto* no incluye mitigaciones "Supply chain to supply chain", ya que la creación de un nuevo producto suele ser un proceso in-house. Basado en lo anterior, se formula la siguiente recomendación:

Recomendación 3: La colaboración entre empresas u outsourcing pueden ser consideradss para que estas cadenas de suministro mejoren sus estrategias actuales de mitigación de riesgos.

El último objetivo es *Dominio de mercado*. Casi 30% de sus mitigaciones son "Supply chain to supply chain". Lo lógico para empresas que ya tienen dominio del mercado es utilizar estrategias pasivas (son miembros dominantes). En este caso, las firmas están dispuestas a conseguir el dominio de mercado creciendo rápidamente o defendiendo su estatus. Para crecer rápido, la colaboración puede ser un buen medio – lo que lleva a la recomendación 3.

La última recomendación es sobre el miembro dominante:

Recomendación 4: los miembros dominantes deben considerar otro tipo de mitigaciones, como cooperativas donde el beneficio es general.

Si la mitigación solo es beneficiosa para él mismo, puede causar obstáculos en las empresas no dominantes y, al final, rebota negativamente en el miembro dominante y en toda la cadena de suministro. Las últimas tendencias en investigación mencionan que la nueva competencia es entre cadenas de suministro y no entre compañías. Si estas mitigaciones no colaborativas dañan la cadena, pueden afectar considerablemente a la obtención de ventajas competitivas.

Las recomendaciones están realizadas basándose en el estudio, pero pueden ser ampliadas a la industria textil europea, debido a su naturaleza genérica.

Análisis futuros deben dedicarse a estudiar las proposiciones descubriendo otras relaciones entre variables, nuevas propuestas para mitigar riesgos y más información sobre el rol del miembro dominante en las cadenas de suministro.

PROJECT SUMMARY

Introduction

The demands of the business environment and the progression of emerging markets are leading to the development of **dynamic and complex supply chain networks** (Braunscheidel and Suresh, 2009; Manuj and Mentzer, 2008; Tummala and Schoenherr, 2011; Spekman and Davis, 2004; Zsidisin et al., 2004) with numerous activities (logistics, inventory, purchasing and procurement, production planning, intra- and inter-organizational relationships and performance measures) usually spread over multiple functions or organizations and sometimes over lengthy time horizons (Arishinder et al., 2008). Consequently, complexity and involvement of numerous suppliers lead to an **increase in risk exposure** for everyone (Pfohl et al. 2010). Due to shorter technology and product life cycles, increased demand for just-in-time deliveries, reduced inventory buffers, and e-business (Brindley, 2004; Fawcett et al., 2011; Giunipero and Eltantawy, 2004; Hallikas et al., 2004; Harland et al., 2003; Narasimhan and Talluri, 2009).

Regarding the dynamic running of the market in any industry of consideration, the textile industry and, more in detail, the apparel industry is continually evolving. In the past, apparel companies prepared their products months before their release. Nowadays, the fashion industry is considered one of the most dynamic industries. The strategy of **"fast fashion"** is overcoming companies such as Gap that is being dethroned by H&M or Zara. The success of this strategy is due to the constant renewal of clothing, extending the offer in number and time. What makes this work correctly is mainly a flexible supply chain, able to adapt to changes reducing design and production lead times to just a few weeks, rather than months.

In this context, where the demand is highly unpredictable, and the life cycle is extremely short, it is essential to analyze risks connected to the supply chain (Martino et al., 2017). Braithwaite and Hall (1999) emphasize that the **relationship between corporate strategy, risk and the implications for supply chain management (SCM)** are poorly understood and in need of further exploration (Jüttner, 2003). There are four types of mitigations regarding the players involved in the strategy and how does it affect the supply chain: **Enterprise to enterprise** (used to mitigate internal risks and with no advantages to other members of the supply chain), **Enterprise to supply chain** (used to mitigate internal risks but with advantages to other members of the supply chain), **Supply chain to supply chain passive** (at least two firms in the supply chain are involved and there are advantages for both companies, but one firm has a proactive role, and the other one has a passive one) and **Supply chain to supply chain cooperative** (at least two companies of the supply chain are involved and it has advantages for both companies and both actively involved).

This paper will focus on mitigations of risks that are classified as Supply chain to supply chain, more deeply studying Supply chain to supply chain passive. Norrman and

Janssen (2008), as well as Tang (2006), put a primary emphasis on collaboration and Giunipero and Eltantawy (2004) bring forward the argument that Supply chain risk management should have a long-term focus and follow a continuous approach, requiring dedication from all supply chain members. Although collaboration was considered years ago, it is a challenging study since two-thirds of the mitigations implemented are usually Enterprise to enterprise or Enterprise to supply chain. When two companies must coordinate or to collaborate, problems may arise and make these mitigations challenging. The relationship between two companies should be beneficial to both, enhancing performance and improving profits. In some cases, the benefits could be higher for one company than another causing conflict between them. Usually, this situation happens when one company is a dominant player in the supply chain - it has the power to influence other companies. The new current waves of innovation and management should boost the idea of open networks, not close markets as in the past. Companies should focus on collaborations and not on competitions as it happened before.

The evolving dynamic structure of the supply chain poses many interesting challenges for effective system coordination: supply chain members cannot compete as independent members. The product used by the end customer passes through a number of entities contributed to the value addition of the product before its consumption. However, the fact that one of the partners generally assumes a dominant role cannot be ignored (Gupta, 2009) and especially considering the case of study: Supply chain to supply chain mitigations (passive and cooperative). The fact that there is a dominant player in the supply chain makes the passive mitigation possible: the non-dominant players will optimize their objectives under the constraints imposed by the dominant members even though individual optimization may not be efficient for the supply chain (Gupta, 2009). In every supply chain, the main players act to create value for the customer. Regarding the role of each player, the probabilities of being a dominant player in the supply chain are higher. Drawing conclusions from Gupta and Singh paper, the main player is the customer. All the supply chain must be designed to fulfill its needs. Since it is an unpredictable and unmanageable player, the next player at the end of the supply chain usually is considered the dominant one: retailers. It is logical to consider that they are with more probability than other the dominant player due to the closeness to customers and considering that their main goal in the supply chain is to fulfill customer desires. Upstream players such as distributors or manufacturers, could play the dominant role in certain supply chains.

The textile industry is a key industry to study the risks and mitigations in a flexible supply chain where innovation is up-to-date and new strategies are constantly introduced. Considering this project is done in collaboration with Politecnico di Milano, the textile industry studied will be the Italian textile industry. Italian products of the textile and apparel industry are known worldwide. Even though Italy is a wealthy and developed country, it is heavily specialized in fashion-oriented as well as semi-customized industrial products. Its production system is based on SMEs. Despite increasing competition from

newly industrializing countries, Italy's textile industry has continued to be an important contributor to the domestic economy - nearly 3% of Italian GDP. Many observers attribute this resilience to the industry's focus on *quality*. This competitive advantage makes other European companies choose "Made in Italy" products over "Made in China". Quality added to the fact that Italy is a closer country, which makes delivery costs and time reduce considerably (fulfill "fast fashion" requirements), makes it an attractable market for European companies.

On the other hand, the industry in Italy is currently suffering a huge threat: thousands of Chinese are being able to buy premises cheaply from Italian businesses that were in bankruptcy and settling an area of Chinese-run factories in Prato, Tuscany. Now, nearly 4.000 Chinese-run clothing factories are producing approximately one million garments a day. Their main factors for success: cheaply made products, mass production and the fact that "fast fashion" forces workers in crowded factories to keep pace. This situation added to the economic crisis which made several companies close in the last decade, could explain the current trend: comparing Italy data with European countries' textile industry average manufacturing, Italian trend is down sloping.

Research Methodology

The focus of this paper will be on Calzedonia (socks) and Intimissimi (underwear and silk wool). Both can be considered the dominant player in their supply chain. Even though they belong to the same company group Calzedonia Agrupar, they can be considered indirect competitors since they operate on the same market target and segment. Their data can exemplify a typical European supply chain. The results of the research could be broadened to other textile companies in Europe and provide guidelines for further research.

Sampieri methodology of the research is **used** (Sampieri, 1991). It is based on **nine steps** when the problem is qualitative*: Idea, Problem approach, Initial immersion in the theme, Study design conception, Definition of the initial study sample and access to it, Data harvest, Data analysis, Interpretation of results*, and *Conclusions and elaboration of the final report.*

The final framework is a mixture of the frameworks and classifications of different authors. The framework proposed follows the same layout as Musa's dissertation framework (2012) based on flows (that provide the connections between companies). Dittman classification provides a classification of risks based on levels and Brenchley a classification based on literature. Additionally, Porter measures strategy fulfillment, and the connection with company's functions and Tang (2006) provides a framework of the necessary mitigations strategies for the supply chain operations.

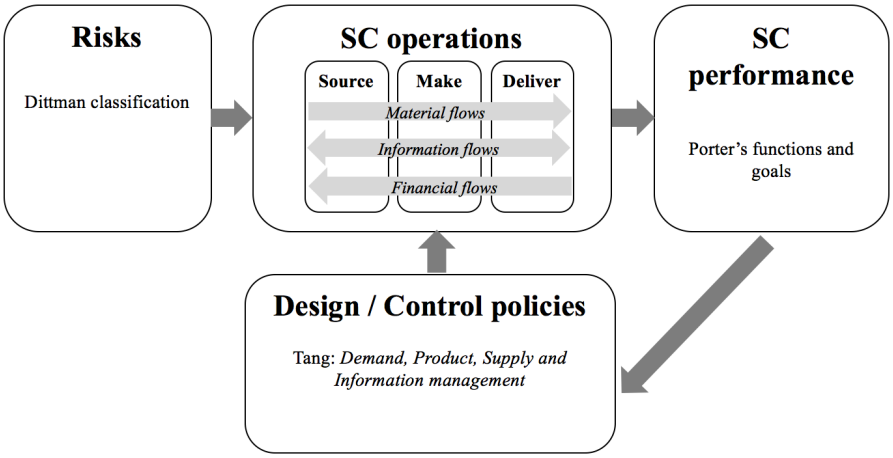

Figure 1: The final framework

The objective of the study is to develop a deeper understanding of the different mitigations strategies where two firms are involved. A better comprehension of risks and how players are acting in the supply chains should be studied. The fact that one of the partners assumes a dominant role cannot be ignored (Gupta, 2009). The non-dominant players optimize their objectives under the constraints imposed by the dominant members even though individual optimization may not be efficient for the supply chain as a whole (Gupta, 2009). The other dimension considered is cooperation and collaboration. Correlation between mitigations of interest and other variables such as firm size, firm functions or financial strength is considered to regard the generation of value that these strategies could bring to the different companies in the supply chain. Finally, the final aim of the study is to broaden the analysis to European textile companies with strategic proposals and recommendations. With these objectives, the following research questions are raised.

RQ1: *How do textile companies mitigate supply chain risks?*

RQ2: *How acts the leader in a supply chain? Is it powerful enough to influence on supply chain companies' decisions?*

RQ3: *How do Supply chain to supply chain passive or cooperative could improve the reputation, financial position, market power…of a company? (Benefits from this kind of risks mitigation)*

RQ4: *In what variables does Supply chain to supply chain mitigations strategies influence?*

RQ5: *Strategic proposals for European textile companies based on their risks and current mitigation strategies.*

Results

Regarding the results of the study, mitigations and risks are very **assorted** in the supply chains of study. There is no primary risk or mitigation strategy concerning occurrence while considering **exposure** the main risks are: *Arrest machinery, Financial handling/practice, Government instability, Product, process and design, Supplier selection/outsourcing* and *Substitutability*.

Based on the results, the following proposition is stated (to be investigated with further research):

Proposition 1: Proposal of different mitigations strategies for the risk of higher exposure

The theoretical ideal in business (from an entrepreneurial perspective) is to be able to put oneself in a position where **neither customers, employees, competitors or suppliers can leverage value from you** while putting yourself in a position to **leverage all of them**. It is important to recognize that if one were in this position then assuming that customers value what we provide for them, we would be in a situation of power over all others in our supply chain relationships (Cox, 1999). **Calzedonia and Intimissimi** are the leading companies generating value in their supply chains due to the **brand power effect**. Without these two players, some of the other companies can suffer from financial weakness, due to the massive amount of orders Calzedonia and Intimissimi generate. This amount of orders makes them dependent on these two influential companies.

In addition to this, there is **evidence** that **Intimissimi acts as a dominant player** in the supply chains. Nearly half of its mitigations are Supply chain to supply chain, where more than 10% are passive strategies. Procedures that involve collaboration and dominance entail the **bargaining power** the player owns. Intimissimi mitigates passively risks with strategies such as *Supplier selection* or establishment of *Long-term relationships*.

Calzedonia only applies Supply chain to supply chain mitigations in less than 40% of the cases. Most of the **risks Calzedonia** is facing could **not be mitigated by compelling other companies** to carry out specific procedures. For example, shipment costs risks are mitigated by freight insurance, or international shipment risks by building a sorting and shipping yard. Neither affects directly other companies of the supply chain.

Sandigliano could also be considered acting as a **dominant player** over their suppliers, regarding the high number of **Supply chain to supply chain mitigations** it is applying. Other facts such as **the real power** of this company over other members of the supply chain entail that it can be considered a valuable player but **not a dominant one**. It is the company before Calzedonia in the supply chain Calzedonia –socks. **The dominant player is Calzedonia, but Sandilgiano is acting li**ke it since it is facing more risks and forcing Italfil to collaborate or mitigate some of their risks.

Based on these results, the following propositions can be formulated:

Proposition 2: Measurement of market dominance of dominant players

Proposition 3: Research of relationships between different players in the supply chain

Proposition 4: The study that proves that the existence of the dominant player entails collaboration between companies in the supply chain

The analysis shows a correlation between **IT level and firm size** with the existence of **Supply chain to supply chain mitigations strategies.** The **low IT level** entails more Enterprise to enterprise mitigations strategies than higher levels do. For those companies, their mayor **risks** are **internal** due to the low IT level, which makes them expend financial surplus in mitigations to themselves. These companies would **be less willing to collaborate** with other companies if they are facing internal constraints in their operations. Indeed, they are not able to be obliged to carry out passive mitigations because of their lack of flexibility and response. Their priority is to become more technologize and, then, they can contemplate other types of mitigations. What this does not mean is that they are not affecting other members of the supply chain with their mitigations strategies – Enterprise to supply chain mitigations are considerably high too in low IT level companies. So, collaboration and cooperation between companies grow with the IT level. It is a similar conclusion to Barau's (2015) study. Relationship with suppliers, customers, and among functional units enhance knowledge creation, innovation orientation and consequently improve the supply chain performance. This finding is similar but not directly related to Chen et al. (2013) who found an indirect effect of marketing capability on the relationship between collaborative communication and customer performance. IT can provide better platforms for interaction between companies, providing a better environment for collaboration and relationship between companies. **Advances in information and communication technology (ICT) enable companies to share information** (Baihaqi et al., 2006).When companies have very high IT levels, they usually also have funding for huge investments, making them perfect candidates for a dominant player role.

Moreover, there is evidence of a correlation between the **size** of the company and **IT level**. Del Aguila-Obra et al. (2006) found that contrary to the literature suggestions, the size of the company does not have any effect on the availability of Internet technologies, but it does for managerial capabilities. The smaller the size of the firm, the higher the possibilities of using the external advice in adopting Internet technologies, because small firms usually have fewer managerial capabilities. In the meantime, more sophisticated technology development is identified in larger firms. **If larger firms are more opened to technology**, the same conclusions as before could be drawn: larger firms promote collaboration and own more power in their supply chains.

There is **no proven correlation between the other variables of study** (Substitutability, the existence of Information Sharing) with Supply chain to supply chain mitigations strategies.

The analysis made did not exhibit any correlation between mitigations of interest and financial position or market power. Lack of some crucial information such as financial statements, relationships between firms or information about the market in Italy could widen the research.

Based on the results, the following propositions are posited:

Proposition 5: Measurement of the correlation of high IT level and dominant player role

Proposition 6: Measurement of the correlation of large firms and dominant player role

Proposition 7: Research of possible variables that have correlations with mitigations strategies where more than two players in the supply chain are involved

Proposition 8: Measurement of the correlation between dominant player role and substitutability risk

Proposition 9: Measurement of the correlation between the existence of a dominant player and information sharing in the supply chain

Conclusion

The research answers the **RQ1: How do textile companies mitigate supply chain risks?** The risks of most exposure are *Financial handling/practice* and *Operational disruption*. Regarding the risks considered (54), the most common mitigations strategies (39) are *Long-term relationships, Long-term planning*, and *Information Sharing*. Two of these mitigations strategies imply more than one company in the supply chain that leads to the third research question **RQ3: How do Supply chain to supply chain passive or cooperative could improve the reputation, financial position, market power…of a company?** Supply chain to supply chain mitigations strategies implies more than one firm is collaborating or being forced to mitigate risks by another one. The analysis made did not exhibit any correlation between mitigations where two firms where involve and financial position or market power. A further analysis where information available is more relevant for the case and could be used to measure better these variables (see Propositions) - such as financial statements of each company and financial variables of the supply chains that could increase consistency and reliability of conclusions.

Moving forward to **RQ2: How acts the leader in a supply chain? Is it powerful enough to influence on supply chain companies' decisions?.** The dominant players of the supply chains are Calzedonia and Intimissimi. There is evidence in the study that the risk of *Substitutability*, can push firms to mitigate it by *Differentiation* or *Product innovation*. These strategies could improve market power or innovation of firms. On the other hand, the pressure that the dominant player exerts over other players could motivate the opposite, finishing with the default of the non-dominant company – great investments and lack of permanence in the supply chain.

When it comes to Supply chain to supply chain passive mitigation strategies, *Pull contract* is the highest in occurrence entailing that some companies of the supply chain have less bargaining power than others. The influential players are pushing their inventory responsibility back into the supply chain, forcing weaker companies to assume all the risk.

This strategy only benefits one player in the supply chain and, usually, causes detriment to the others.

The most important part of the analysis focuses on **RQ4: In what variables does Supply chain to supply chain mitigations strategies influence?** There is evidence that these mitigations strategies correlate with firm size and the IT level of a company.

Finally, **RQ5: Strategic proposals for European textile companies based on their risks and current mitigation strategies** are answered considering Porter's study. As in Dittman and Musa's classifications, operations are the most affected by risks. "Fast fashion" plays a determinant role in this conclusion. Operations must be flexible and able to fulfill orders in a short period. If risks are affecting operations, the company is weakened, the recommendation i*s:*

Recommendation 1: Exhaustive control when it comes to operational risks

Several studies claim that Supply chain risk management boosts performance such as Lavastre, Gunasekaran, & Spalanzani (2011).

Regarding risk exposure, Marketing and Sales and Inbound Logistics are the critical areas in this case. The risks with the highest exposure belong to Marketing and Sales and Operations, and their occurrence is also high which leads to the second recommendation:

Recommendation 2: Collaborative mitigations for risks with such a high occurrence should be considered. In this case, focusing on Operational and Marketing and Sales' risks. If companies of the same supply chain work together against specific risks, the effectiveness of mitigations strategies would be higher than alone.

This type of mitigations is usually less expensive than Enterprise to enterprise mitigations – since another firm is involved too adding their resources– but, at the same time, there are more challenging to implement, i.e., collaboration or power is needed.

Regarding the goals of the firms, *Competitive advantage* goal is a cooperative goal where to gain an advantage it is necessary to build long-term relationships with other players in the supply chain – similar to Proposal 2. So, Supply chain to Supply chain mitigation strategies can be considered enablers of *Competitive advantage* in these supply chains – evidence of the relationship between these strategies and fulfillment of firms' goals. Furthermore, *Price leader* and *Cost advantage* could also be considered competitive advantages (*Price/cost* in Li et al. research) generating the same conclusions as *Competitive advantage* goal – even though supply chain to supply chain mitigation occurrence is reduced in those cases.

New product goal does not include supply chain to supply chain mitigations strategies. Developing a new product is usually a process made in-house. Based on these analysis, the following recommendation can be formulated:

Recommendation 3: Collaboration between companies or outsourcing capabilities could be proposals for these supply chains to improve current strategies for mitigating risks.

The last company's objective is *Market dominance.* Nearly 30% of their mitigation strategies are Supply chain to supply chain. The logical Supply chain to supply chain mitigation strategy for companies that have already achieve Market dominance is a passive strategy (they are dominant players). In this case, the firms are willing to achieve Market dominance either by growing fast or defending their status. For growing fast, collaboration could be a right mean – which leads to Proposal 3.

The last recommendation regards the dominant player:

Recommendation 4: dominant players should consider other mitigation strategies, such as cooperative that benefit both.

If the mitigation strategy only benefits itself, it can cause obstacles in the non-dominant firm that, in the end, rebind negatively on the dominant player and the supply chain as a whole. Current research trends imply that the new competition is between supply chains and not between firms. If these non-collaborative mitigations harm the supply chain, passive strategies can negatively affect the fulfillment of competitive advantages.

The recommendations made are based on the study but could be broadened to European textile industry due to their generic nature.

Future research is devoted to studying the propositions highlighting other relationships between variables, new proposals for mitigating risks and more information about the role the dominant player has in the supply chains.

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ABSTRACT

This research presents a different analysis of risks and mitigations strategies in the textile industry, focusing on mitigations strategies where two companies are involved – passively or collaboratively, with the aim of achieving a different insight of the problem and making recommendations concerning best practice. A multiple case study was conducted in three different supply chains. The review founded that the dominant player in the supply chain has power to influence on other player's decisions and that collaboration is essential in supply chain management. These findings indicate the importance of cooperative and passive mitigation strategies. Furthermore, another breakthrough of the report is that operational risks are critical in the textile industry, due to the strategy companies are currently adopting: Fast fashion.

Keywords: *supply chain risk management; cooperative mitigations; passive mitigations; dominant player; textile industry.*

EXECUTIVE SUMMARY

Introduction

The demands of the business environment and the progression of emerging markets are leading to the development of **dynamic and complex supply chain networks** (Braunscheidel and Suresh, 2009; Manuj and Mentzer, 2008; Tummala and Schoenherr, 2011; Spekman and Davis, 2004; Zsidisin et al., 2004) with numerous activities (logistics, inventory, purchasing and procurement, production planning, intra- and inter-organizational relationships and performance measures) usually spread over multiple

functions or organizations and sometimes over lengthy time horizons (Arishinder et al., 2008). Consequently, complexity and involvement of numerous suppliers lead to an **increase in risk exposure** for everyone (Pfohl et al. 2010). Due to shorter technology and product life cycles, increased demand for just-in-time deliveries, reduced inventory buffers, and e-business (Brindley, 2004; Fawcett et al., 2011; Giunipero and Eltantawy, 2004; Hallikas et al., 2004; Harland et al., 2003; Narasimhan and Talluri, 2009).

Regarding the dynamic running of the market in any industry of consideration, the textile industry and, more in detail, the apparel industry is continually evolving. In the past, apparel companies prepared their products months before their release. Nowadays, the fashion industry is considered one of the most dynamic industries. The strategy of **"fast fashion"** is overcoming companies such as Gap that is being dethroned by H&M or Zara.

The success of this strategy is due to the constant renewal of clothing, extending the offer in number and time. What makes this work correctly is mainly a flexible supply chain, able to adapt to changes reducing design and production lead times to just a few weeks, rather than months. More importantly, they are using these capabilities to change the assortment (i.e., introduce new products) more frequently, which many practitioners claim increases sales since there is evidence showing that customers visit more often the stores with fresher products (Caro, 2009).

In this context, where the demand is highly unpredictable, and the life cycle is extremely short, it is essential to analyze risks connected to the supply chain (Martino et al., 2017).

Among practitioners, risk-taking is perceived as an integrated and inevitable part of management (March et al., 1987). Braithwaite and Hall (1999) emphasize that the

relationship between corporate strategy, risk and the implications for supply chain management (SCM) are poorly understood and in need of further exploration (Jüttner, 2003).

Supply chain risk management (SCRM) is the implementation of strategies to manage both, every day and exceptional risks, along with the supply chain based on continuous risk assessment with the aim of reducing vulnerability and ensuring continuity. Involving all supply chain's stakeholders is a vehicle to fulfill the mitigation of risks. The Supply chain management impacts on the firm's financial performance, which makes it a valuable area to study. The risks' mitigations in a supply chain entail costs, so these strategies need to be measured to balance expenses (pros), and benefits (cons) of implementing them. Furthermore, managing a supply chain means managing it entirely: not only tier 1 suppliers but also players such as distributors, carriers, ports, transportations hubs, warehouses (Mitchell, 2007).

When it comes to the textile industry, risks can be shared with other industries such as natural disasters, terrorism or political threats. However, some risks are associated with the textile industry. An example of this is *supply shortages*, more relevant nowadays due to "fast fashion."

Risks can be classified in several ways. . Risk sources do not exclusively reside in the effects of external events, such as legal restrictions or natural disasters, but also in the impact of internal changes of strategies, business models and interaction with the actors of the supply network (Tang, 2006). Dittman accomplished a risk classification which regards this division. The mitigations strategies rely on the supply chain risks. There are four types

of mitigations regarding the players involved in the strategy and how does it affect the supply chain.

Table 1: ***Mitigations classification***

Mitigations	Description
Enterprise to enterprise (EE)	Used to mitigate internal risks**.** No advantages to other members of the supply chain
Enterprise to supply chain (SC)	Used to mitigate internal risks**.** Advantages to other members of the supply chain
Supply chain to supply chain passive (SCSC passive)	At least two firms in the supply chain are involved. Advantages for both companies, but one firm has a proactive role, and the other one has a passive one.
Supply chain to supply chain cooperative (SCSC cooperative)	At least two companies of the supply chain are involved. Advantages for both companies and both actively involved

A critical aspect of mitigating supply chain risk proactively is to build flexibility in the supply chain (Tang & Tomlin, 2008). While there are many tactics for mitigating risks, it is essential to know that the goal is not always about eliminating the risk but to reduce the risk to a level that is acceptable to the firm and the focus of the risk mitigation strategy should be on creating controls that monitor and handle the identified risk.

Supply chain to supply chain cooperative strategies are mainly based on **information sharing**. Information sharing enables companies to make better decisions in their operation leading to better resource utilization and lower supply chain costs. Advances in information and communication technology (ICT) enable companies to share information (Baihaqi et al., 2006). Supply chain structure is how companies are arranged to form a supply chain and how all activities are linked (Cooper, Lambert et al. 1997;

Lambert, Cooper et al. 1998; Lambert and Cooper 2000). An individual company can participate in a number of supply chains (Cooper, Lambert et al. 1997; Mentzer, DeWitt et al. 2001). Cooper et al. (1997) suggest that companies need to determine carefully with which partners of supply chains they should be tightly integrated. Cooper et al. also point out that level of integration depends on various factors including firm capabilities, the complexity of products, and corporate culture. As information sharing is the foundation of supply chain integration (Lee 2000), decisions on the level of integration are strongly correlated with decisions on what information should be shared and how it should be allocated. Cooper et al. (1997) contend that designing the configuration of the supply chain is, not merely determining with whom companies should integrate, but also **how a company's activities are linked to those of their partners** and deciding **what information should be made accessible** by partners (Baihaqi et al., 2006).

Numerous studies analyze the value of information sharing in a supply chain and factors that affect this value. The overall objective of information sharing is to achieve efficiency in the whole supply chain. Nevertheless, it is apparent that different parties obtain different returns from information sharing (see Table 2 from Baihaqi et al.'s paper, 2006). Ideally, all members of a supply chain should share the benefits equally, but members with monopoly power may obtain most of the benefits (Baihaqi et al., 2006), what is viewed as the dominant players.

Table 2: ***Information sharing benefits – Literature. Source: Baihaqi, 2006***

Benefits and allocation	**Authors**
Inventory reduction. Not all partners obtain benefits	Lau et al. (2002)
Manufacturer gain benefits	Simchi-Levi and Zhao (2003)
Only the supplier gain benefits	Mitra and Catterjee (2004)

All parties benefit. Non-sharing partners also gain benefits	Waller et al. (1999)
Not many benefits for retailers	Huang and Gangopadhyay (2004)
Not significant benefits from information sharing	Cachon and Fisher (2000)
Manufacturer gain more benefits	Yu et al. (2001)
Only manufacturer benefits	Lee et al. (2000)
Manufacturer gain benefits	Smaros et al. (2003)
Reduce but not eliminate the bullwhip effect	Chen et al. (2000)
Supplier gain more benefits	Bourland et al. (1996)

The **different allocation of benefits** suggests a **dominant player** in the supply chain. Mitigations strategies where a dominant player is involved are usually **supply chain to supply chain passive** strategies. Literature gaps are considerable when it comes to these mitigations. Dominant players are usually well-established players in the industry they operate in, who attract competition and, if so, also risks. Small-sized suppliers can be weakened or even damage with dominant player's decisions. For example, if a firm decides to change supplier, it could entail financial damage or even bankruptcy in extreme cases for the substituted players. On the other hand, this competition also entails benefits for the supply chain: firms are forced to innovate and invest in technology to mitigate the risks generated by the dominant player. In table 3, some of the most common mitigations strategies of this type are considered.

Table 3: ***Mitigations – Supply chain to Supply chain passive***

Mitigations	**Description**	**Authors**

Supplier selection	The strategic decision which entails consequences for different players in the supply chain	Florez-Lopez (2007), Thirucheval et al. (2011), Wadhwa et al. (2007)
Push inventory responsibility back (pull contract)	Single wholesale price but now the supplier charges that wholesale price for both pre-book and at-once orders. The retailer pulls inventory from the supplier with at-once orders, thereby leaving the supplier with all inventory risk	Cachon (2004), Dong et al. (2007)
Closed contracts	Bargaining power of one player influences on the contract between two players	Choi et al. (2012), Haucao et al. (2013)
Pre-vetted new suppliers	Making sure they are financially stable and corporately responsible. Done by the dominant company and helped by the other companies in the SC.	Boyens et al. (2015), Wan et al. (2006)
Penalties	For not fulfilling the contract	Fehrenbacher et al. (2017), Hwang et al. (2015), Sappintong (1983)

This paper focuses on mitigations of risks that are classified as **supply chain to supply chain** strategies. Norrman and Janssen (2008), as well as Tang (2006), put a primary emphasis on **collaboration** and Giunipero and Eltantawy (2004) bring forward the argument that supply chain risk management should have a long-term focus and follow a continuous approach, requiring **dedication from all supply chain members**. Although

collaboration was considered years ago, it is a demanding study since two-thirds of the mitigations implemented are usually Enterprise to enterprise or Enterprise to supply chain.

Problems may arise when two companies must coordinate and collaborate making these type of mitigations challenging. Firstly, the r**elationship** between two companies should be **beneficial to both,** enhancing performance and improving profits. In some cases, the benefits could be more significant for one company than for another one, causing conflict between them. Usually, this happens when one company is a dominant player in the supply chain having the **power to influence other companies**.

The new current waves of innovation and management should boost the idea of open networks, not close markets as in the past. Companies should focus on collaborations and not on competitions as it happened before.

The main challenges may be the **lack of transparency** of some companies and **lags in communication** between two companies (lowers efficiency and increases costs because companies cannot react immediately to changes in demand or other conditions).

Lavastre, Gunasekaran, & Spalanzani (2011) ranked in their paper *"Supply chain risk management in French companies*" the mitigations strategies applied in fifty French companies. In the top five mitigation strategies, three of them where collaborative mitigations: *Communication and information exchange (forecasting, operational), Accompanying providers/ suppliers in improving their performance, Forecast accuracy, Long-term continuity in relations with partners* and *Safety stocks (Vendor owned inventory (VOI) or in-house).*

Their research concluded that a company is never isolated, as it is part of a chain. Likewise, to be effective, Supply chain risk management cannot be practiced in isolation.

The very definition of Supply chain management, managing the flow of products, components, and information, must be transversal and seek to integrate supply chain partners. Transversal management seems very appropriate to manage supply chains and risks effectively. The study demonstrates that Supply chain risk management is an operational management tool. It is also a strategic tool with a defined long-term master plan allocating resources and demonstrating the willingness to collaborate with industrial partners within an organization and between different partners of the same chain. This conclusion fully supports current mainstream research in supply chain management, i.e., that collaboration is the key to overall supply chain performance (Lavastre et al., 2011).

There is an increasing emphasis on improving coordination and cooperation among supply chain partners in the supply chain research literature. The evolving dynamic structure of the supply chain poses many exciting challenges for effective system coordination: **supply chain members cannot compete as independent members**. The product used by the end customer passes through many entities contributed to the value addition of the product before its consumption. However, the fact that one of the partners assumes a dominant role cannot be ignored (Gupta, 2009) and especially considering the case of study: supply chain to supply chain mitigations (passive and cooperative). The existence of this dominant player empower passive mitigations: the **non-dominant players optimize their objectives under the constraints imposed by the dominant members even though individual optimization may not be efficient for the supply chain as a whole** (Gupta, 2009).

In every supply chain, the main players act to produce value for the customer. Considering the **role** of each member, the **probabilities of being a dominant player** in

the supply chain are **higher**. Gupta and Singh (2015) explained the challenges actors have when performing their role in the supply chain and how this performance influences on other players. Moreover, they studied which players have enough power to control the supply chain and, therefore, be the dominant player.

- **Supplier:** the supplier plays an essential role as it helps the organization to achieve the excellence (Shah and Shrivastava, 2012) – with right products, channels, quantities and timing, both the customer and the supplier increases revenue. So, closer long-term relationship with suppliers should be built. This **relationship implies communication and information sharing** (joint quality and production planning) between buyer and supplier (Theodorakioglou et al., 2010). Supplier selection becomes a crucial strategic decision that has long-term impacts on a company's profitability and efficiency (Muralidhar et al., 2010). It is a challenging issue because it requires a battery of evaluation criteria/attributes (Ming-Lang et al., 2009). According to Choi and Hartley (1996), with a well-developed long-term relationship, a supplier becomes a part of a well-managed supply chain, and it has a lasting effect on the competitiveness of the entire supply chain.
- **Manufacturing organization:** investing capacity for research, development, and manufacturing. It is the trust, commitment and market reputation of the manufacturer which motivates distributor and retailer to invest and kept inventory. Companies that can rapidly develop high performing production systems can also develop competitive advantage in today's global environment. The increasing competition has driven firms to, **not only improve their internal**

operations but also focus on integrating their suppliers into overall value chain processes (Olhager and Prajogo, 2012).

- **Distributor:** distributors play an essential role in the supply chain – from just-in-time procurement strategies to risk management, they can bring real value to customers. In today's economic environment, distributors are being relied on heavily as our customers are more likely to order smaller volumes of products on a more frequent basis. Established partnerships with distributors provide for continuity and trust of supply. Wholesalers give distributors the opportunity to purchase in small quantities or can be relied on for special orders. Thus, distributors are not stuck tying up capital in inventory that otherwise might end up being dead stock. Distributors can also benefit by receiving shorter order lead times from wholesalers, which in turn help them turn product faster. While competition exists not only on the organizations but also on the supply chains, organizations are seldom worked alone and form a lot of strategic partners or align with their suppliers to empower synergy. They **focus** on their **core competency** and outsource the other business process or form partnership with each other. The main idea is to make sure that every party of the supply chain is more efficient and effective than its competitors of other supply chains. It seems that the collaboration between manufacturer and retailer is the essential solution to manage demand uncertainty for having a good supply chain performance.
- **Retailer:** The **closest to the end-customers** are the retailers providing the link to the manufacturers and suppliers products. A dominant retailer acts as a leader and therefore directly or indirectly affects other players in the chain including the

manufacturers. A discussion about how retailers dominate the supply chain and its vital leadership roles to achieve its ultimate goal of customer satisfaction is introduced. The discussion focuses on dominant retailer's roles; however, similar roles are also played by other dominant players in the supply chain, such as manufacturers or suppliers. Suppliers and manufacturers are defined as the upstream players where retailers' products are arising. Both these players are assumed to deliver goods to the retailers and may be used interchangeably. To consider a retailer a dominant player it should be studied how this player achieves the position of power in the industry. Some of the significant roles of a dominant retailer in the supply chain are leading the competition, value creation, stimulant of innovation and price setter. Retailers cannot perform their role in supply chain without close interaction with other functions of the supply chain.

- **Customer:** is the **main driving force of the market**. The customer service management process is the firm's face to the customer. It provides the single source of customer information, such as product availability, shipping dates and order status. Real-time information is provided to the customer through interfaces with the firm's functions, such as manufacturing and logistics. The current trend shows that fundamental shifts in consumer behavior and the demand creation patterns caused by these shifts. It is time to understand the needs of the end-customer and to **align supply chain strategy behind end-customer needs** in the market-place.

Drawing conclusions from Gupta and Singh paper (2015), the primary player is the customer. All the supply chain must be designed to fulfill its needs. Since it is an

unpredictable and unmanageable actor, the next member at the end of the supply chain usually is granted as the dominant player: retailers. It is logical to consider that they are with more probability the dominant player than another member due to the closeness to customers and considering that their primary goal in the supply chain is to fulfill customer desires, i.e., build value for the customer. Upstream players such as distributors or manufacturers, could play the dominant role in specific supply chains. Circumstances of each supply chain should be studied to define the dominant player of the supply chain due to the influence of other factors such as financial strength, market power or exciting partnerships.

Research framework and research questions

The focus of the research is on **mitigations strategies that involve more than one player in the supply chain**. **Tang** (2006) classifies the Supply chain risk management problem in four different macro sources.

Table 4: ***Tang classifications of the Supply chain risk management problem. Source: Tang, 2006***

Classification	Description
Supply Management	Classified in five issues: *Supply network design, Supplier relationship (*such as vertical integration or information sharing), *Supplier selection process, Supplier order allocation* (uncertain demands, uncertain yields, uncertain supply lead times, uncertain supply costs and uncertain supply capacity*)* and *Supply contracts*.
Demand Management	Strategies to control demands dynamically to avoid a mismatch with the capacity and mitigate risks. So, the different strategies considered are: *Shifting demand across time* (revenue management and seasonal demand management: capture customers in different segments who are willing to pay different

	prices in different moments in time), *Shifting demand across markets* and *Shifting demand across products*
Product Management	Product variety leads to increased manufacturing complexity and cost (trade-off between them to maximize profits). The ways considered to reduce uncertainty are *Postponement strategy* (modular design) and *Process sequencing* (reversing the sequence of manufacturing processes in the supply chain).
Information Management	Fisher classification of information strategies is reflected: *Strategies for fashion products* (reduce inventory level) and *Strategies for functional products* (longer life cycles – market information is critical for generating an accurate demand forecast).

Supply chain management is about matching supply and demand which is associated with inventory management: too much supply leads to inefficient capital investment and costs, while too much demand generates the opportunity cost of lost margins. Each situation is the consequence of one of two types of inventory risk: risk of excessive inventory (Inventory risk) or the risk of insufficient supply (Supply risk). Because most supply chains are incapable of perfectly matching supply and demand, all of the firms in a supply chain bear at least some supply risk (Cachon, 2004). Tang in its classification includes mitigations strategies for both risks: supply management and demand management.

Musa (2012) explained that a supply chain could be divided into three different flows: earlier Supply chain management focused on the **material flows** and other flows such as **financial and information flows**. Risk can create disruptions in either one or a

combination of these flows. Similar ideas have been presented by Chopra and Sodhi (2004), Johnson (2001) and Spekman and Davis (2004), whom all identify the dimension of risk in the form of supply chain flows. The risk event can disrupt one flow or in a combination of more flows.

Material flow can be defined as the physical movement of products from suppliers to customers**. Financial flows** are letters of credit, timely payment of bills, bankruptcy, payment schedules, credit terms and suppliers' contracts. Finally, **Information flows** are, for example, order status, order delivery, and inventory status. The **system** can be considered a **process model of source (supply), make (production) and deliver (demand).** Decision variables such as design and control policies are determined and improved based on analyzing performance measures just as in any supply chain. Supply chain operations can be affected by various risk events which, finally, affect performance. Monitoring of performance could identify the impact of disruption on supply chains: with mitigation strategies, disruption of flows could be diminished, or even avoided.

Flows regard the connections between two different firms which provide a framework for the case of study (mitigations where two firms are involved).

Dittman classified risks in two main blocks: risks **belonging to the supply chain (Levels 1-3)** and risk not belonging but **supporting the supply chain (Level 4)** providing a classification that can regard the nature of the risk. Another classification of risks in supply chains is the one proposed by **Harland, Brenchley, and Walker** in their article: "*Risk in supply networks"* (2003), depicted in table 5. Considering that strategic, financial or competitive risks are essential for answering the research questions proposed, this classification is suitable for the study.

Table 5: ***Brenchely et al. (2003) classification of risks. Source Brenchely, 2003***

Classification	Description	Authors
Strategic risk	Affects business strategy implementation	Simons (1999)
Operations risk	Affects a firm's internal ability to produce and supply goods/services	Simons (1999) and Meulbrook (2000)
Supply risk	Adversely affects the inward flow of any resource to enable operations to take place	Meulbrook (2000)
Competitive risk	Affects a firm's ability to differentiate its products/services from its competitors	Simons (1999)
Reputation risk	Erodes the value of whole business due to loss of confidence	Schwartz and Gibb (1999)
Financial risk	Exposes a firm to potential loss through changes in financial markets; can also occur when specific debtors default	Meulbrook (2000)
Fiscal risk	arises through changes in taxation	Meulbrook (2000)
Regulatory risk	exposes the firm to changes in regulations affecting the firm's business, such as environmental regulation	Meulbrook (2000)
Legal risk	exposes the firm to litigation with action arising from customers, suppliers, shareholders or employees	Meulbrook (2000)
Customer risk	Affects the likelihood of customers placing orders; grouped with factors such as product obsolescence in "product/market risk."	Meulbrook (2000)
Asset impairment risk	Reduces utilization of an asset and can arise when the ability of the asset to generate income is reduced	Simons (1999)

Competitive advantage grows out of value a firm can create for its buyers that exceed the firm's cost of creating it. **Value** is what buyers are willing to pay, and superior value stems from offering lower prices than competitors for equivalent benefits or providing unique benefits that more than offset a higher price (**Porter**, 1985). The **functions** that a company needs to create value are *Firm infrastructure, Human resources management, Technology, Procurement, Inbound Logistics, Operations, Outbound logistics, Marketing & Sales,* and *Service.*

Porter's first classification of **firms' goals** basing on *Cost focus strategy and Differentiation strategy* is *Competitive advantage, Cost advantage, Market dominance, New product development, Contraction/Expansion, Price leadership, Global, Reengineering, Downsizing, Delayering,* and *Restructuring*. Furthermore, his classification of **strategies to achieve the goal** is: *Grow fast, Grow in line with the industry, Defend existing status, Catch up, Turn around, Hang in* and *Harvest.* These classifications are used to categorize goals in the conducted research.

Framework

The final framework is a mixture of the frameworks and classifications described before. The framework proposed follows the same layout as Musa's. Dittman classification provides a classification of risks based on levels. Additionally, Porter measures strategy fulfillment, and the connection with company's functions and Tang provides a framework of the necessary mitigations strategies for the supply chain operations.

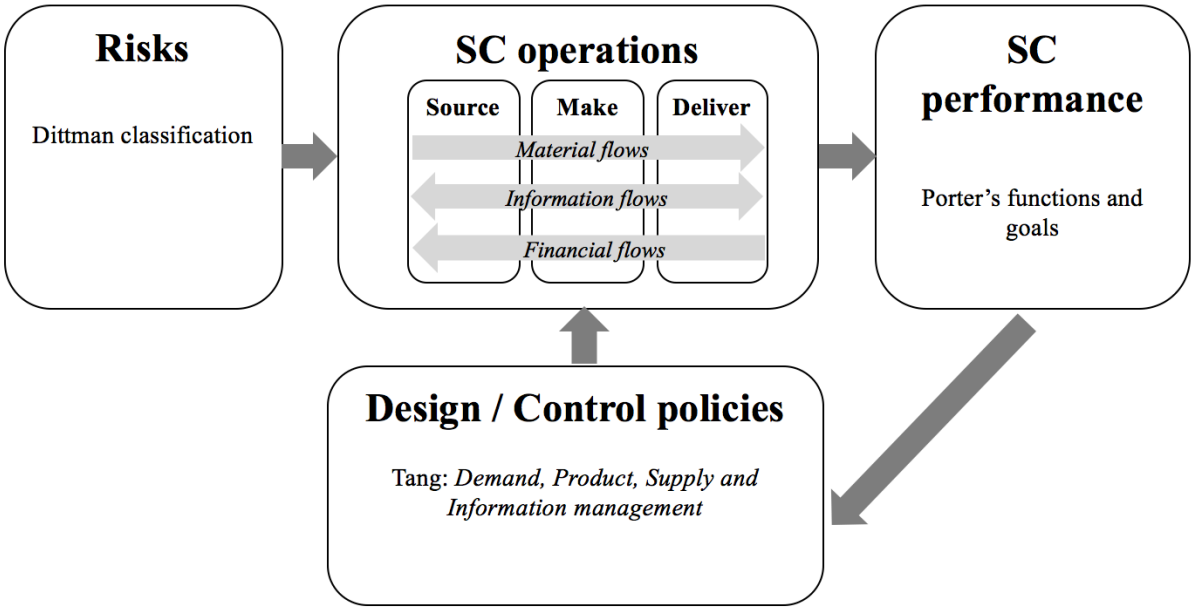

Figure 1: The final framework

Research Questions

The objective of the study is to develop a deeper understanding of the different mitigations strategies where two firms are involved. A better comprehension of risks and how players are acting in the supply chains should be studied. The fact that one of the partners assumes a dominant role cannot be ignored (Gupta, 2009). The non-dominant players optimize their objectives under the constraints imposed by the dominant members even though individual optimization may not be efficient for the supply chain as a whole (Gupta, 2009). The other dimension considered is cooperation and collaboration.

Correlation between mitigations of interest and other variables such as firm size, firm functions or financial strength is considered to regard the generation of value that these strategies could bring to the different companies in the supply chain.

Finally, the final aim of the study is to broaden the analysis to European textile companies with strategic proposals and recommendations. With these objectives, the following research questions are raised.

RQ1: *How do textile companies mitigate supply chain risks?*

RQ2: *How acts the leader in a supply chain? Is it powerful enough to influence on supply chain companies' decisions?*

RQ3: *How do Supply chain to supply chain passive or cooperative could improve the reputation, financial position, market power…of a company? (Benefits from this kind of risks mitigation)*

RQ4: *In what variables does Supply chain to supply chain mitigations strategies influence?*

RQ5: *Strategic proposals for European textile companies based on their risks and current mitigation strategies.*

RESEARCH METHODOLOGY

Sampieri methodology of the research is **used** (Sampieri, 1991). It is based on **nine steps** when the problem is qualitative*: Idea, Problem approach, Initial immersion in the theme, Study design conception, Definition of the initial study sample and access to it, Data harvest, Data analysis, Interpretation of results*, and *Conclusions and elaboration of the final report.*

The information available has been updated considering **reasonable assumptions** in case of lack of information. With the aim of updating all the information, financial statements, current strategic objectives and the latest news about the companies are regarded. Some information has been more difficult to obtain. However, as

abovementioned, **data** used is mainly **second-handed** due to the confidentiality of this data, which provides competitive advantages to the firms and cannot be published. The final aim of the paper is not to expose perfect information, but, with the information available, to obtain the relevant conclusions. For most of the firms, risks that were relevant in the past analysis, are still important today.

Overview of the case studies

The Italian textile industry is weaker than it was before. In consequence, companies face more risks. The study is carried out by updating information available of three supply chains: **Intimissimi – underwear, Intimissimi – silk wool** and **Calzedonia – socks**. Their data can exemplify a typical European supply chain. The results of the research could be broadened to other textile companies in Europe and provide guidelines for further research.

Case 1: Calzedonia – socks

Calzedonia is an Italian fashion brand, founded in Verona in 1987 with the aim to create a new way of selling hosiery and beachwear for women, men and children, through a franchising sales network. Currently, it has more than 2.000 shops throughout the world (in more than 24 countries). Some critical factors for its success are a **vast range of products, "fast fashion,"** particular attention paid to **fashion** trends and **quality-price ratio**. Calzedonia main products are tights, stockings, leggings, socks, and beachwear. The study centers on socks' supply chain where *Italfil, Sandigliano*, and *Calzedonia* are the main players.

Italfil is a small firm located in Biella. It has been in the yarns market for more than 50 years, producing high-quality worsted yarns. They provide utmost attention to **product quality and service** making them one of the world leaders in the sector. They offer

customization, tailoring the yarn, and own research (machinery, equipment, methods, planning) which allows them to **innovate**, and adapt to market changes and customer requirements continually. One of their key points for success is **flexibility**: geographical closeness to partners and focus on customers enable them to minimize development time. Furthermore, they have a selection of ready-made items, guarantee rapid delivery.

Recofil is a small firm located in Sandigliano. No further information about strategies of the company is found but, comparing current economic data with the one available; the company has **suffered a reduction of turnover and number of employees**. The risks of the previous study are summed to some additional expected risks.

Case 2: Intimissimi – underwear

Intimissimi directly manufactures their own-label underwear. Other clothing (pajamas, knitwear) seems to be produced externally, due to the fact there are not their primary product. It has subcontractors specialized in knitting, dyeing, and molding (for bras). Suppliers are very diverse regarding size from considerable suppliers to small local dyeing mills and from very structured to family-run businesses (Thogson, 2011). Intimissimi main products are bras, knickers, lingerie, clothing, nightwear clothing and accessories.

The main players in Intimissimi – underwear supply chain are *Franzoni, Friultex, Timavo & Tivene* and *Intimissimi*. *Franzoni* and *Timavo & Tivene* are two companies which are facing **default.** Since no other information is available about the new current players of this supply chain, a pre-bankruptcy situation is granted in which their financial weakness provides their main additional risks. The financial situation of these companies affects considerably other players in the supply chain, adding new risks also to them.

Friultex is a small company located in Azzano Decimo, Udine that serves customers in Italy. The offer is mainly **natural fabrics** such as cotton, wool, micro modal, and silk. It only has around 15 employees although its turnover has grown in the last years, and it is close to 7 million euros. However, since 2011, their turnover has decreased by 6,5 million entailing that the company has **lost position** and power in these last years assumably due to the economic recession.

Case 3: Intimissimi – silk wool

The main players in Intimissimi – silk wool supply chain are *Italfil, Sandigliano, Friultex, Trucco Tessile, Ma. Re.* and *Intimissimi*. *Italfil, Sandigliano*, and *Friultex* have been already described. *Trucco Tessile* is a new player in this supply chain. *Boglietti* (the **first underwear factory** in Italy and still today one of the most important companies in the production and marketing of underwear) was the firm in this supply chain before, but *Trucco Tessile* acquired it in 2014. Assuming the customers, and strategy of the company is the same, they still supply *Ma.Re.*

Ma. Re. is an **underwear company**, mainly T-shirt manufacturer located in Chions. This company sales to **distributors and wholesalers**. Their underwear is "Made in Italy," **high-quality** with basic designs made off cotton and wool. In 2013, Armani ordered them 300 million euros of underwear to Ma. Re. boosting companies sales.

Table 6: ***Case 1: Calzedonia– Socks***

No. in Supply Chain	Firm	Size	No. Employees	Turnover (M€)	Turnover / Employees (M€/No.)	Role	Info. Sharing
1	Italfil	Small	45	6,9	0,15	Basic Manufacturing	Yes

2	Sandigliano	Small	40	1,5	0,04	Basic Manufacturing	Yes
3	Calzedonia	Large	14625	705,0	0,05	Basic Material Transformation	No

Table 7: ***Case 2: Intimissimi – Underwear***

No. in Supply Chain	**Firm**	**Size**	**No. Employees**	**Turnover (M€)**	**Turnover / Employees (M€/No.)**	**Role**	**Info. Sharing**
1	Franzoni	Medium	83	34,0	0,41	Basic Manufacturing	No
2	Friultex	Small	16	7,2	0,45	Basic Manufacturing	Yes
3	Timavo & Tivene	Medium	110	17,5	0,16	Basic Manufacturing	Yes
6	Intimissimi	Large	8125	665,0	0,08	Basic Material Transformation	No

Table 8: ***Case 3: Intimissimi – Silk Wool***

No. in Supply Chain	**Firm**	**Size**	**No. Employees**	**Turnover (M€)**	**Turnover / Employees (M€/No.)**	**Role**	**Info. Sharing**
1	Italfil	Small	45	6,9	0,15	Basic Manufacturing	Yes
2	Sandigliano	Small	40	1,5	0,04	Basic Manufacturing	Yes
3	Friultex	Small	16	7,2	0,45	Basic Manufacturing	Yes
4	Truco Tessile	Medium	99	13,0	0,13	Basic Material Transformation	Yes
5	Ma. Re.	Medium	60	4,4	0,07	Basic Material Transformation	Yes
6	Intimissimi	Large	8125	665,0	0,08	Basic Material Transformation	No

Results

Risks and mitigations strategies

Mitigations and risks are very **assorted** in the supply chains of study. There is no primary risk or mitigation strategy concerning occurrence while considering **exposure** the main risks are: *Arrest machinery, Financial handling/practice, Government instability, Product, process and design, Supplier selection/outsourcing* and *Substitutability*.

Table 9: ***Summary of results – Mitigations and risks.***

Risk	Mitigations	Occurrence	Exposure
Arrest machinery	Continuous maintenance	0,2%	16
	Customer selection	0,5%	2
	Information sharing	0,2%	4
	In-house repair shop	0,5%	2
	Outsourcing	0,2%	16
	Process innovation	0,2%	2
	Spare warehouse	0,5%	2
Bottleneck machine	Buy new machine	0,7%	4
	No mitigation available	0,5%	1
Changing brand	Long-term planning	0,7%	4
Culture and ethics	Market knowledge	0,5%	4
Ecological regulations	Certification	1,0%	4
	Reach standards	0,7%	4
Economic crisis	Long-term planning	1,0%	6
	Long-term relationship	2,2%	8
Environmental disruptions	Long-term relationship	0,5%	2
	Process innovation	0,5%	2
Exchange rate risk	Determining operation exposure	0,5%	3
Fashion collection design	Stylist	0,5%	2
	Supplier selection	0,7%	2

Financial exposition	Customer selection	1,2%	1
	Supplier selection	0,7%	2
Financial handling/practice	New management	0,7%	20
The financial strength of supply chain partners	Information sharing	1,0%	8
Finding new machinery	No mitigation available	1,2%	1
Government instability	Long-term planning	3,2%	12
Human resources group dynamics	Continuous maintenance	0,5%	1
	No mitigations available	2,2%	4
Human renewal	Professional integration	1,0%	6
	Quality control	0,5%	1
	No mitigations available	0,2%	3
Importation taxes	No mitigations available	1,2%	4
Industrial accident	Security protocols and measure	0,2%	1
	Training	0,2%	1
Industrial district missing	Information sharing	2,0%	2
	No mitigations available	0,5%	6
Information accuracy	Long-term relationship	2,2%	8
Information outsourcing	Closed contract	2,7%	9
Information system security and disruption	Outsourcing	2,7%	8
Intellectual property	Certification	0,7%	1
International regulations	No mitigations available	1,2%	4
International shipment delays	Sorting and shipping yard	0,7%	4
	Supplier selection	0,7%	4
Key customer absence	Buyer's option	0,5%	4
	Differentiation	0,7%	3
Key employee absence	Professional integration	0,5%	2
	No mitigation available	1,5%	2
Machinery innovation	Long-term relationship	1,0%	2

	Long-term planning	0,2%	4
	No mitigations available	0,7%	5
Mistakes on large order	Quality control	2,2%	8
No information sharing	Information sharing	1,0%	6
Old infrastructure	Continuous maintenance	0,7%	3
	In-house repair shop	0,7%	3
	Plant renewal	0,5%	3
Operational disruption	Process innovation	0,7%	16
Planned orders reduction	Customer selection	1,2%	8
	Differentiation	1,2%	8
	Information sharing	1,2%	8
	Marketing	1,2%	8
	Safety fund	1,2%	8
Price and cost	Long-term planning	1,7%	5
Product innovation absence	Long-term relationship	0,7%	2
Product, process and design	Process innovation	0,7%	15
	Product innovation	0,7%	15
Raw material costs	Buyer's option	1,2%	5
	Raw material warehouse	1,7%	4
Raw materials procurement	Long-term planning	0,7%	4
	More suppliers	0,2%	2
	Professional integration	0,5%	1
	Pull contract	2,0%	3
	Raw materials warehouse	1,5%	4
	Supplier order allocation	0,5%	2
	Supplier selection	1,2%	4
Supply chain interruption	Long-term relationship	1,0%	5
	No mitigations available	1,0%	5
Seasonal demand	Discounts	0,5%	4
	Information sharing	2,0%	4
	Long-term planning	1,2%	5

	Long-term relationship	0,5%	3
	Pull contract	2,0%	4
Shipment costs	Own transport	1,7%	3
Shipment delays	Long-term planning	0,2%	4
	Outsourcing	0,2%	4
Shipment risks	Freight insurance	1,2%	2
	Own transport	0,2%	2
Sourcing flexibility	Information sharing	0,5%	4
	Long-term relationship	0,5%	4
	More suppliers	0,5%	4
	Partnership	0,5%	4
Spare parts for old machinery	Spare warehouse	0,7%	2
Supplier delays	Differentiation	1,2%	2
	Long-term planning	0,5%	2
	Raw materials warehouse	0,7%	2
	Supplier selection	0,2%	2
Supplier selection/outsourcing	Long-term relationship	0,7%	10
Supply chain partners' relationships	Long-term relationship	1,0%	8
Supply product monitoring/quality	Quality control	2,2%	6
Substitutability	Differentiation	0,2%	16
	Long-term relationship	1,2%	4
	Product innovation	0,5%	12
Technical person absence	Professional integration	0,5%	2
Theft	Freight insurance	0,2%	3
	Theft insurance	2,7%	2
No payment received	Credit insurance	0,2%	3
	Customer selection	1,0%	2

Based on the abovementioned results, the following proposition is stated (to be investigated with further research):

Proposition 1: Proposal of different mitigations strategies for the risk of higher exposure

Dominant player role

The theoretical ideal in business (from an entrepreneurial perspective) is to be able to put oneself in a position where **neither customers, employees, competitors or suppliers can leverage value from you** while putting yourself in a position to **leverage all of them**. It is important to recognize that if one were in this position then assuming that customers value what we provide for them, we would be in a situation of power over all others in our supply chain relationships (Cox, 1999). **Calzedonia and Intimissimi** are the leading companies generating value in their supply chains due to the **brand power effect**. Without these two players, some of the other companies can suffer from financial weakness, due to the massive amount of orders Calzedonia and Intimissimi generate. This amount of orders makes them dependent on these two influential companies.

In addition to this, there is **evidence** that **Intimissimi acts as a dominant player** in the supply chains. Nearly half of its mitigations are Supply chain to supply chain, where more than 10% are passive strategies. Procedures that involve collaboration and dominance entail the **bargaining power** the player owns. Intimissimi mitigates passively risks with strategies such as *Supplier selection* or establishment of *Long-term relationships*.

Calzedonia only applies Supply chain to supply chain mitigations in less than 40% of the cases. Most of the **risks Calzedonia** is facing could **not be mitigated by compelling other companies** to carry out specific procedures. For example, shipment costs risks are mitigated by freight insurance, or international shipment risks by building a sorting and shipping yard. Neither affects directly other companies of the supply chain.

Sandigliano could also be considered acting as a **dominant player** over their suppliers, regarding the high number of **Supply chain to supply chain mitigations** it is applying. Other facts such as **the real power** of this company over other members of the supply chain entail that it can be considered a valuable player but **not a dominant one**. It is the company before Calzedonia in the supply chain Calzedonia –socks. **The dominant player is Calzedonia, but Sandilgiano is acting li**ke it since it is facing more risks and forcing Italfil to collaborate or mitigate some of their risks.

Based on these results, the following propositions can be formulated:

Proposition 2: Measurement of market dominance of dominant players

Proposition 3: Research of relationships between different players in the supply chain

Proposition 4: The study that proves that the existence of the dominant player entails collaboration between companies in the supply chain

Mitigations strategies correlation with other variables

The analysis shows a correlation between **IT level and firm size** with the existence of **Supply chain to supply chain mitigations strategies.** The **low IT level** entails more Enterprise to enterprise mitigations strategies than higher levels do. For those companies, their mayor **risks** are **internal** due to the low IT level, which makes them expend financial surplus in mitigations to themselves. These companies would **be less willing to collaborate** with other companies if they are facing internal constraints in their operations. Indeed, they are not able to be obliged to carry out passive mitigations because of their lack of flexibility and response. Their priority is to become more technologize and, then, they can contemplate other types of mitigations. What this does not mean is that they are not

affecting other members of the supply chain with their mitigations strategies – Enterprise to supply chain mitigations are considerably high too in low IT level companies. So, collaboration and cooperation between companies grow with the IT level. It is a similar conclusion to Barau's (2015) study. Relationship with suppliers, customers, and among functional units enhance knowledge creation, innovation orientation and consequently improve the supply chain performance. This finding is similar but not directly related to Chen et al. (2013) who found an indirect effect of marketing capability on the relationship between collaborative communication and customer performance. IT can provide better platforms for interaction between companies, providing a better environment for collaboration and relationship between companies. When companies have very high IT levels, they usually also have funding for huge investments, making them perfect candidates for a dominant player role. **Advances in information and communication technology (ICT) enable companies to share information** (Baihaqi et al., 2006).

Moreover, there is evidence of a correlation between the **size** of the company and **IT level**. Del Aguila-Obra et al. (2006) founded that contrary to the literature suggestions, the size of the company does not have any effect on the availability of Internet technologies, but it does for managerial capabilities. The smaller the size of the firm, the higher the possibilities of using the external advice in adopting Internet technologies, because small firms usually have fewer managerial capabilities. In the meantime, more sophisticated technology development is identified in larger firms. **If larger firms are more opened to technology**, the same conclusions as before could be drawn: larger firms promote collaboration and own more power in their supply chains.

There is **no proven correlation between the other variables of study** (Substitutability, the existence of Information Sharing) with Supply chain to supply chain mitigations strategies.

The analysis made did not exhibit any correlation between mitigations of interest and financial position or market power. Lack of some crucial information such as financial statements, relationships between firms or information about the market in Italy could widen the research.

Based on the results, the following propositions are posited:

Proposition 5: Measurement of the correlation of high IT level and dominant player role

Proposition 6: Measurement of the correlation of large firms and dominant player role

Proposition 7: Research of possible variables that have correlations with mitigations strategies where more than two players in the supply chain are involved

Proposition 8: Measurement of the correlation between dominant player role and substitutability risk

Proposition 9: Measurement of the correlation between the existence of a dominant player and information sharing in the supply chain

Conclusions

The research answers the **RQ1: How do textile companies mitigate supply chain risks?** The risks of most exposure are *Financial handling/practice* and *Operational disruption*. Regarding the risks considered (54), the most common mitigations strategies (39) are *Long-term relationships, Long-term planning*, and *Information Sharing*. Two of

these mitigations strategies imply more than one company in the supply chain that leads to the third research question **RQ3: How do Supply chain to supply chain passive or cooperative could improve the reputation, financial position, market power…of a company?** Supply chain to supply chain mitigations strategies implies more than one firm is collaborating or being forced to mitigate risks by another one. The analysis made did not exhibit any correlation between mitigations where two firms where involve and financial position or market power. A further analysis where information available is more relevant for the case and could be used to measure better these variables (see Propositions) - such as financial statements of each company and financial variables of the supply chains that could increase consistency and reliability of conclusions.

Moving forward to **RQ2: How acts the leader in a supply chain? Is it powerful enough to influence on supply chain companies' decisions?.** The dominant players of the supply chains are Calzedonia and Intimissimi. There is evidence in the study that the risk of *Substitutability*, can push firms to mitigate it by *Differentiation* or *Product innovation*. These strategies could improve market power or innovation of firms. On the other hand, the pressure that the dominant player exerts over other players could motivate the opposite, finishing with the default of the non-dominant company – great investments and lack of permanence in the supply chain.

When it comes to Supply chain to supply chain passive mitigation strategies, *Pull contract* is the highest in occurrence entailing that some companies of the supply chain have less bargaining power than others. The influential players are pushing their inventory responsibility back into the supply chain, forcing weaker companies to assume all the risk.

This strategy only benefits one player in the supply chain and, usually, causes detriment to the others.

The most important part of the analysis focuses on **RQ4: In what variables does Supply chain to supply chain mitigations strategies influence?** There is evidence that these mitigations strategies correlate with firm size and the IT level of a company.

Finally, **RQ5: Strategic proposals for European textile companies based on their risks and current mitigation strategies** are answered considering Porter's study. As in Dittman and Musa's classifications, operations are the most affected by risks. "Fast fashion" plays a determinant role in this conclusion. Operations must be flexible and able to fulfill orders in a short period. If risks are affecting operations, the company is weakened, the recommendation i*s:*

Recommendation 1: Exhaustive control when it comes to operational risks

Several studies claim that Supply chain risk management boosts performance such as Lavastre, Gunasekaran, & Spalanzani (2011).

Regarding risk exposure, Marketing and Sales and Inbound Logistics are the critical areas in this case. The risks with the highest exposure belong to Marketing and Sales and Operations, and their occurrence is also high which leads to the second recommendation:

Recommendation 2: Collaborative mitigations for risks with such a high occurrence should be considered. In this case, focusing on Operational and Marketing and Sales' risks. If companies of the same supply chain work together against specific risks, the effectiveness of mitigations strategies would be higher than alone.

This type of mitigations is usually less expensive than Enterprise to enterprise mitigations – since another firm is involved too adding their resources– but, at the same time, there are more challenging to implement, i.e., collaboration or power is needed.

Regarding the goals of the firms, *Competitive advantage* goal is a cooperative goal where to gain an advantage it is necessary to build long-term relationships with other players in the supply chain – similar to Proposal 2. So, Supply chain to Supply chain mitigation strategies can be considered enablers of *Competitive advantage* in these supply chains – evidence of the relationship between these strategies and fulfillment of firms' goals. Furthermore, *Price leader* and *Cost advantage* could also be considered competitive advantages (*Price/cost* in Li et al. research) generating the same conclusions as *Competitive advantage* goal – even though supply chain to supply chain mitigation occurrence is reduced in those cases.

New product goal does not include supply chain to supply chain mitigations strategies. Developing a new product is usually a process made in-house. Based on this, the following recommendation can be formulated:

> **Recommendation 3:** Collaboration between companies or outsourcing capabilities could be proposals for these supply chains to improve current strategies for mitigating risks.

The last company's objective is *Market dominance.* Nearly 30% of their mitigation strategies are Supply chain to supply chain. The logical Supply chain to supply chain mitigation strategy for companies that have already achieve Market dominance is a passive strategy (they are dominant players). In this case, the firms are willing to achieve Market

dominance either by growing fast or defending their status. For growing fast, collaboration could be a right mean – which leads to Proposal 3.

The last recommendation regards the dominant player:

Recommendation 4: dominant players should consider other mitigation strategies, such as cooperative that benefit both.

If the mitigation strategy only benefits itself, it can cause obstacles in the non-dominant firm that, in the end, rebind negatively on the dominant player and the supply chain as a whole. Current research trends imply that the new competition is between supply chains and not between firms. If these non-collaborative mitigations harm the supply chain, passive strategies can negatively affect the fulfillment of competitive advantages.

The recommendations made are based on the study but could be broadened to European textile industry due to their generic nature.

Future research is devoted to studying the propositions highlighting other relationships between variables, new proposals for mitigating risks and more information about the role the dominant player has in the supply chains.

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CHAPTER 1

INTRODUCTION & STATE OF ART

Introduction

The demands of the business environment and the progression of emerging markets are leading to the development of dynamic and complex supply chain networks (Braunscheidel and Suresh, 2009; Manuj and Mentzer, 2008; Tummala and Schoenherr, 2011; Spekman and Davis, 2004; Zsidisin et al., 2004) with numerous activities (logistics, inventory, purchasing and procurement, production planning, intra- and inter-organizational relationships and performance measures) usually spread over multiple functions or organizations and sometimes over lengthy time horizons (Arishinder et al., 2008). Consequently, complexity and involvement of numerous suppliers lead to an increase in risk exposure for everyone (Pfohl et al. 2010). Due to shorter technology and product life cycles, increased demand for just-in-time deliveries reduced inventory buffers, and e-business (Brindley, 2004; Fawcett et al., 2011; Giunipero and Eltantawy, 2004; Hallikas et al., 2004; Harland et al., 2003; Narasimhan and Talluri, 2009).

Regarding the dynamic running of the market in any industry of consideration, the textile industry and, more in detail, the apparel industry is continually evolving. In the past, apparel companies prepared their products months before their release. Nowadays, the fashion industry is considered one of the most dynamic industries. The strategy of "fast fashion" is overcoming companies such as Gap that is being dethroned by H&M or Zara.

The success of this strategy is due to the constant renewal of clothing, extending the offer in number and time. What makes this work correctly is mainly a flexible supply chain, able to adapt to changes reducing design and production lead times to just a few weeks,

rather than months. More importantly, they are using these capabilities to change the assortment (i.e., introduce new products) more frequently, which many practitioners claim increases sales since there is evidence showing that customers visit more often the stores with fresher products (Caro, 2009).

In this context, where the demand is highly unpredictable, and the life cycle is extremely short, it is essential to analyze risks connected to the supply chain (Martino, Fera, 2017).

Supply Chain Management

Among practitioners, risk-taking is perceived as an integrated and inevitable part of management (March and Shapira, 1987). For supply chain contexts, Braithwaite and Hall (1999) emphasize that the relationship between corporate strategy, risk and the implications for Supply chain management are poorly understood and in need of further exploration (Jüttner, 2003).

Supply Chain Risk Management (SCRM) is the implementation of strategies to manage both, every day and exceptional risks, along with the supply chain based on continuous risk assessment with the aim of reducing vulnerability and ensuring continuity. Usually, it is done by involving all supply chain's stakeholders. In the textile industry, the standard structure of the supply chain is the one represented in Figure 2.

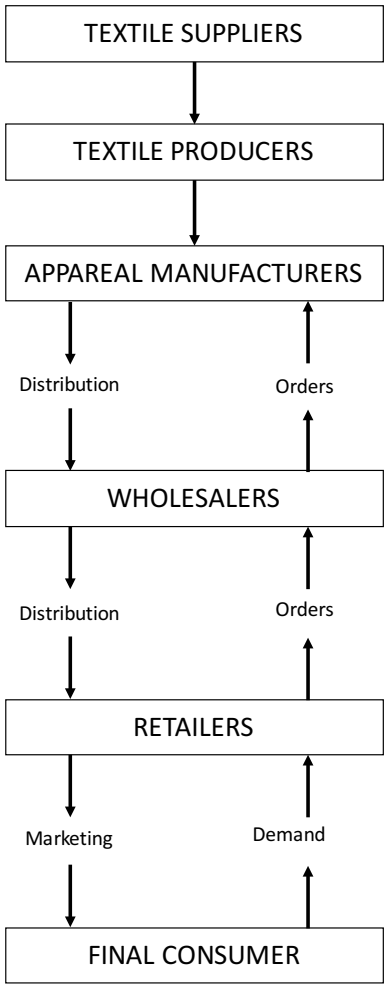

Figure 2: ***Typical Textile Supply Chain Structure***

The Supply Chain Management (SCM) impacts on the firm's financial performance, which makes it a valuable area to consider. The mitigations of risks in a supply chain entail costs, so they need to be measured to balance expenses (pros), and benefits (cons) of the mitigations studied.

In addition, managing a supply chain means managing it entirely: not only tier 1 suppliers but also distributors, carriers, ports, transportations hubs, warehouses… (Mitchell, 2007).

In the textile industry risks can be shared with other industries such as natural disasters, terrorism or political threats. However, some risks are linked to textile industry. An example of this is *supply shortages*, more important nowadays due to "fast fashion."

Risks and Mitigations Strategies

Risks

Risks can be classified in several ways. The one considered in this paper is pictured in Figure 3 (Dittman, 2014). Risk sources do not exclusively reside in the effects of external events, such as legal restrictions or natural disasters, but also in the impact of internal changes of strategies, business models and interaction with the actors of the supply network (Tang, 2006). So, the primary division is between Macro environment risks (have potential effects across the entire supply chain) and Functional risks (existing risks in the areas that give support to the supply chain). These types of risks and its mitigations will be considered in this paper.

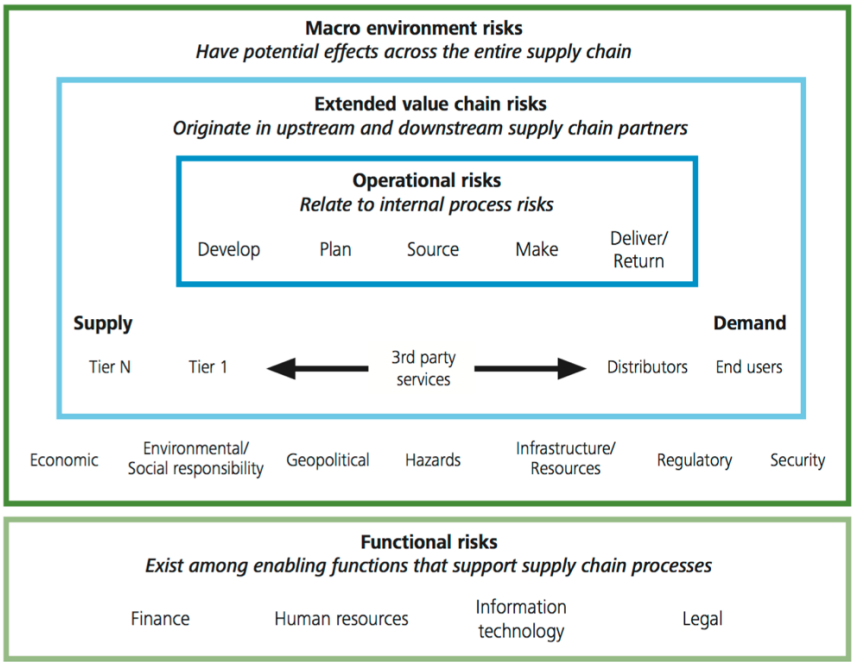

Figure 3: ***Risks Classification. Source: Dittman, 2014***

The main risks in a textile supply chain are summarized in the following table (Table 10).

Table 10: ***Main Risks in a supply chain***

Risks
Quality and safety challenges
Supply shortages
Legal issues
Security and IT problems
Regulatory & environmental compliance
Weather & natural disasters
Terrorism
Cost volatility
Sourcing a new supplier may imply changes in SCM
Brand and reputational risks
Internationalization
Vertical integration
Financial risks

Mitigations Strategies

The mitigations strategies depend on the supply chain risks. There are four types of mitigations considering the difference between the aim of the mitigation.

Table 11: ***Mitigations classification***

Mitigations	**Description**
Enterprise to Enterprise (EE)	Used to mitigate internal risks**.** No advantages to other members of the supply chain

Enterprise to Supply Chain (SC)	Used to reduce internal risks**.** Benefits to other members of the supply chain
Supply chain to Supply chain passive (SCSC passive)	At least two firms in the supply chain are involved. Advantages for both companies, but one firm has a proactive role, and the other one has a passive one.
Supply chain to Supply chain cooperative (SCSC cooperative)	At least two companies of the supply chain are involved. Advantages for both actors and both are actively involved.

The main mitigations strategies in the textile industry are listed in Table 12.

Table 12: ***Main Mitigations risks in a Textile Supply Chain***

Mitigations
Logistics: Supply Chain Optimization
Cybersecurity
Finance
Reserve inventory
Supplier Quality Management Software
Supply Chain visibility
Corporate Social Responsibility
Supplier Management
Pre-vetted new suppliers (make sure they are financially stable and corporate responsible)
Insurance
Evaluation of political environment of suppliers

One crucial aspect of mitigating supply chain risk proactively is to build flexibility in the supply chain (Tang & Tomlin, 2008). While there are many tactics for mitigating risks, it is essential to know that the goal is not always about eliminating the risk but to

reduce the risk to a level that is acceptable to the firm and the focus of the risk mitigation strategy should be on creating controls that monitor and handle the identified risk.

Supply chain to Supply chain cooperative mitigations strategies are mainly based on information sharing. Information sharing enables companies to make better decisions in their operation leading to better resource utilization and lower supply chain costs. Advances in information and communication technology (ICT) would allow companies to share information (Baihaqi et al., 2006). Supply chain structure is how companies are arranged to form a supply chain and how all activities are linked (Cooper, Lambert et al. 1997; Lambert, Cooper et al. 1998; Lambert and Cooper 2000). An individual company can participate in many supply chains (Cooper, Lambert et al. 1997; Mentzer, DeWitt et al. 2001). Cooper et al. (1997) suggest that companies need to determine carefully with which partners of supply chains they should be tightly integrated. Cooper et al. also point out that level of integration depends on various factors including firm capabilities, the complexity of products, and corporate culture. As information sharing is the foundation of supply chain integration (Lee 2000), decisions on the level of integration are strongly correlated with decisions on what information should be shared and how it should be shared. Cooper et al. (1997) contend that designing the configuration of the supply chain is not merely determining with whom companies should integrate but also designing how a company's activities are linked to those of their partners and deciding what information should be made accessible by partners (Baihaqi et al., 2006).

Numerous studies analyze the value of information sharing in a supply chain and factors that affect the value. The overall objective of information sharing is to achieve efficiency in the whole supply chain. However, it is apparent that different parties obtain

different returns from information sharing (see Table 13 from Baihaqi et al.'s paper). Ideally, all members of a supply chain should share the benefits equally, but members with monopoly power may obtain most of the benefits – dominant players (Baihaqi et al., 2006).

Table 13: ***Information sharing benefits – Literature. Source: Baihaqi, 2006***

Authors	Benefits and allocation
Lau et al. (2002)	Inventory reduction. Not all partners obtain benefits
Simchi-Levi and Zhao (2003)	Manufacturer gain benefits
Mitra and Catterjee (2004)	Only the supplier gain benefits
Waller et al. (1999)	All parties benefit. Non-sharing partners also gain benefits
Huang and Gangopadhyay (2004)	Not many benefits for retailers
Cachon and Fisher (2000)	Not significant benefits from information sharing
Yu et al. (2001)	Manufacturer gain more benefits
Lee et al. (2000)	Only manufacturer benefits
Smaros et al. (2003)	Manufacturer gain benefits
Chen et al. (2000)	Reduce but not eliminate the bullwhip effect
Bourland et al. (1996)	Supplier gains more benefits

The different allocation of benefits suggests a dominant player in the supply chain. Mitigations strategies where a dominant player is involved are usually Supply Chain to supply chain passive strategies. Literature gaps are considerable when it comes to these strategies. Dominant players are well-established players in the industry they operate in, who attract competition and, if so, also risks. Small-sized suppliers can be weakened or even damage with dominant player's decisions. For example, if a firm decides to change supplier, it could entail financial damage or even bankruptcy in extreme cases for

substituted players. On the other hand, this competition also involves benefits for the supply chain: firms are forced to innovate and invest in technology to mitigate the risks generated by the dominant player. In table 14, some of the most common mitigations strategies of this type are considered.

Table 14: ***Mitigations – Supply chain to Supply chain passive***

Mitigations	Description	Authors
Supplier selection	The strategic decision which entails consequences for different players in the supply chain	Florez-Lopez (2007), Thirucheval et al. (2011), Wadhwa et al. (2007)
Push inventory responsibility back (pull contract)	Single wholesale price but now the supplier charges that wholesale price for both pre-book and at-once orders. The retailer pulls inventory from the supplier with at-once orders, thereby leaving the supplier with all inventory risk	Cachon (2004), Dong et al. (2007)
Closed contracts	Bargaining power of one player influences on the deal between two players	Choi et al. (2012), Haucao et al. (2013)
Pre-vetted new suppliers	Making sure they are financially stable and corporately responsible. Done by the dominant company and helped by the other companies in the supply chain.	Boyens et al. (2015), Wan et al. (2006)
Penalties	For not fulfilling the contract	Fehrenbacher et al. (2017), Hwang et al. (2015), Sappintong (1983)

Literature gaps

This paper will focus on mitigations of risks that are classified as Supply Chain to supply chain. Norrman and Janssen (2008), as well as Tang (2006), put a primary emphasis on collaboration and Giunipero and Eltantawy (2004) bring forward the argument that Supply chain risk management should have a long-term focus and follow a continuous approach, requiring dedication from all supply chain members. Although collaboration was considered years ago, it is a challenging study since two-thirds of the mitigations implemented are usually Enterprise to enterprise or Enterprise to supply chain. However, problems may arise and can make these mitigations challenging when two companies must coordinate or collaborate. Firstly, the relationship between two companies should be beneficial to both, enhancing performance and improving profits. In some cases, the benefits could be higher for one company than another causing conflict between them. Usually, this happens when one company is a dominant player in the supply chain, where it has the power to influence other companies. The new current waves of innovation and management should boost the idea of open networks, not close markets as in the past. Companies should focus on collaborations and not on competitions as it happened before.

For these mitigations to be implemented, not only coordination and collaboration between different companies should be established, but also inside the firm (across different organizational functions: marketing, sales, production, product design, procurement, logistics, finance and information technology).

Some other challenges are the lack of transparency of some companies and lags in communication between two companies (lowers efficiency and increases costs because companies cannot react immediately to changes in demand or other conditions).

Lavastre, Gunasekaran, & Spalanzani (2011) ranked in their paper *"Supply Chain Risk Management in French Companies*" the mitigations strategies used in the companies they studied. In the top five, three of them where collaborative mitigations: *Communication and information exchange (forecasting, operational), Accompanying providers/ suppliers in improving their performance, Forecast accuracy, Long-term continuity in relations with partners* and *Safety stocks (Vendor owned inventory (VOI) or in-house)*.

A company is never isolated, as it is part of a chain. Likewise, to be effective, Supply chain risk management cannot be practiced in isolation. The very definition of Supply chain management, managing the flow of products, components, and information, must be transversal and seek to integrate supply chain partners. Transversal management seems very appropriate to manage supply chains and risks effectively. Our study demonstrates that Supply chain risk management is an operational management tool with tangible actions manifesting in the field, relayed by department heads, and with the participation of operators and employees. It is also a strategic tool with a defined long-term master plan allocating resources and demonstrating the willingness to collaborate with industrial partners within an organization and between different partners of the same chain. This conclusion fully supports current mainstream research in Supply chain management, i.e., that collaboration is the key to overall supply chain performance (Lavastre et al., 2011).

Regarding that Supply chain risk management can be considered as a strategic tool, this paragraph emphasizes the importance of collaboration between companies inside the supply chain and employees inside the company of study.

Dominant Player in a Supply Chain

There is an increasing emphasis on improving coordination and cooperation among supply chain partners in the supply chain research literature. The evolving dynamic structure of the supply chain poses many exciting challenges for effective system coordination: supply chain members cannot compete as independent members. The product used by the end customer passes through many entities contributed to the value addition of the product before its consumption. However, the fact that one of the partners assumes a dominant role cannot be ignored (Gupta, 2009) and especially considering the case of study: Supply Chain to supply chain mitigations (passive and cooperative). The existence of this player makes the passive mitigation possible: the non-dominant players will optimize their objectives under the constraints imposed by the dominant members even though individual optimization may not be efficient for the supply chain as a whole (Gupta, 2009).

In every supply chain, the main players act to create value for the customer. Regarding the role of each player, the probabilities of being a dominant player in the supply chain are higher. Gupta and Singh (2015) explained the challenges each one has when they play their role in the supply chain and how this affects the other players, considering which players have enough power to control the supply chain and, therefore, be the dominant player.

- **Supplier:** the supplier plays a vital role as it will help the organization to achieve the excellence (Shah and Shrivastava, 2012) – with right products, channels, quantities and timing, both the customer and the supplier will increase revenue. So, closer long-term relationship with suppliers should be established. This

relationship implies communication and information sharing (joint quality and production planning) between buyer and supplier (Theodorakioglou et al., 2010). Supplier selection becomes a crucial strategic decision that has long-term impacts on a company's profitability and efficiency (Muralidhar et al., 2010). It is a challenging issue because it requires a battery of evaluation criteria/attributes (Ming-Lang et al., 2009). According to Choi and Hartley (1996), with a well-developed long-term relationship, a supplier becomes a part of a well-managed supply chain, and it will have a lasting effect on the competitiveness of the entire supply chain.

- **Manufacturing organization:** investing capacity for research, development, and manufacturing. It is the trust, commitment and market reputation of the manufacturer which motivates distributor and retailer to invest and kept inventory. Companies that can rapidly develop high performing production systems can also develop competitive advantage in today's global environment. The increasing competition has driven firms to, not only improve their internal operations but also focus on integrating their suppliers into overall value chain processes (Olhager and Prajogo, 2012).
- **Distributor:** distributors play an essential role in the supply chain – from just-in-time procurement strategies to risk management, they can bring real value to customers. In today's economic environment, distributors are being relied on heavily as our customers are more likely to order smaller volumes of products on a more frequent basis. Established partnerships with distributors provide for continuity and trust of supply. Wholesalers give distributors the opportunity to

purchase in small quantities or can be relied on for special orders. Thus, distributors are not stuck tying up capital in inventory that otherwise might end up being dead stock. Distributors can also benefit by receiving shorter order lead times from wholesalers, which in turn help them turn product faster. While competition exists not only on the organizations but also on the supply chains, organizations are seldom worked alone and will form a lot of strategic partners or align with their suppliers to empower synergy. They will focus on their core competency and outsource the other business process or form partnership with each other. The main idea is to make sure that every party of the supply chain is more efficient and effective than its competitors of other supply chains. It seems that the collaboration between manufacturer and retailer is the essential solution to manage demand uncertainty for having a good supply chain performance.

- **Retailer:** The closest to the end-customers are the retailers providing the link to the manufacturers and suppliers products. A dominant retailer acts as a leader and therefore directly or indirectly affects other players in the chain including the manufacturers. Retailers dominate the supply chain and its vital leadership roles to achieve its ultimate goal of customer satisfaction is discussed. The discussion focuses on dominant retailer's roles; however, similar roles are also played by other dominant players in the supply chain, such as manufacturers or suppliers. Suppliers and manufacturers here are defined as the upstream players where retailers' products are coming from. Both these players are assumed to deliver goods to the retailers and may be used interchangeably. To consider a retailer a dominant player it should be studied how this player achieves the position of

power in the industry. Some of the significant roles of a dominant retailer in the supply chain are leading the competition, value creation, stimulant of innovation and price setter. Retailers cannot perform their role in supply chain without close interaction with other functions of the supply chain.

- **Customer:** is the main driving force of the market. The customer service management process is the firm's face to the customer. It provides the single source of customer information, such as product availability, shipping dates and order status. Real-time information is provided to the customer through interfaces with the firm's functions, such as manufacturing and logistics. The current trend shows that fundamental shifts in consumer behavior and the demand creation patterns caused by these shifts. It is time to understand the needs of the end-customer and to align supply chain strategy behind end-customer needs in the market-place.

Drawing conclusions from Gupta and Singh paper, the central player is the customer. All the supply chain must be designed to fulfill its needs. Since it is an unpredictable and unmanageable player, the next player at the end of the supply chain usually is considered the dominant one: retailers. It is logical to consider that they are with more probability than other the dominant player due to the closeness to customers and considering that their primary goal in the supply chain is to fulfill customer desires. Upstream players such as distributors or manufacturers, could play the dominant role in specific supply chains. Circumstances of each supply chain should be studied to define the dominant player of the supply chain due to the influence of other factors such as financial strength, market power or exciting partnerships.

CHAPTER 2

MOTIVATION

After considering the abovementioned points, the textile industry is a crucial industry to study the risks and mitigations in a flexible supply chain where innovation is up-to-date, and new strategies are introduced continuously. Risks are studied on a day to day basis, considering that this industry's time to market is short and that forecasting the demand is extremely difficult. Considering this project is done in collaboration with Politecnico di Milano, the textile industry studied will be the Italian textile industry.

Italian Apparel and Textile Industries

Italian products of the textile and apparel industry are known worldwide. Even though Italy is a wealthy and developed country, it is specialized in fashion-oriented as well as semi-customized industrial products. Its production system is based on Small and medium enterprises (SMEs).

Despite increasing competition from newly industrializing countries, Italy's textile industry has continued to be an essential contributor to the domestic economy - nearly 3% of Italian Gross domestic product (GDP). Many observers attribute this resilience to the industry’s focus on *quality*. This competitive advantage makes other European companies choose "Made in Italy" products over "Made in China." Quality added to the fact that Italy is a nearby country, which makes delivery costs and time reduce considerably (fulfill "fast fashion" requirements), makes it an attractable market for European companies.

On the other hand, the industry in Italy is currently suffering a considerable threat: thousands of Chinese are being able to buy premises cheaply from Italian businesses that were in bankruptcy and settling an area of Chinese-run factories in Prato, Tuscany. Now,

nearly 4.000 Chinese-run clothing factories are producing approximately one million garments a day. Their main factors for success: cheaply made products, mass production and the fact that "fast fashion" forces workers in crowded factories to keep pace. Adding this threat to the economic crisis which made several companies close in the last decade, could explain the trends shown in the following figures. Comparing Italy data with European countries' textile industry average manufacturing, Italian trend is downsloping (Figure 4).

Figure 4: ***Textile industry trend in Italy (comparing with the average of UE countries). Source Linkiesta.***

Regarding the apparel industry, the graph (Figure 5) shows volatile data. The scenario is less agonizing than before. Even though the data is still negative for most periods, in 2016 there are some periods of positive deviations entailing the post-crisis future scenario. If this is so, it could push the recovery of the textile industry, due to the fact they are closely linked.

Figure 5: ***Apparel industry trend in Italy (comparing with the average of UE countries). Source Linkiesta.***

Calzedonia Agrupar

Considering the diversity of companies in the textile world, the focus of this paper will be on Calzedonia and Intissimi. Both can be considered the dominant player in their supply chain. So, an in-depth study on how these companies mitigate risk would be carried out. The focus of the study would be on how these firms carry out a Supply chain to supply chain passive mitigation. Even though they belong to the same company group Calzedonia Agrupar, they can be considered indirect competitors since they focus on the same market target and segment. It is interesting to consider these companies, since they belong to the same company group which makes them "strategically similar" (or supposedly) but, at the same time, their competency makes them innovative, and their risks' mitigation is could in different ways. The main aim of the paper will be to study the risks and mitigations both

apply to their supply chain and compare the different strategies they are considering when mitigating risks. This study will be focused on obtaining a study method for future research or the study of other supply chains. The information considered it would not always be perfect due to the confidentiality that this information entails. Under lack of information, reasonable assumptions would be carried out, considering the economic environment, textile industry data and companies' information.

Case 1: Calzedonia - socks

Calzedonia is an Italian fashion brand, founded in Verona in 1987 and, as it is stated on its website, “with the aim to create a new way of selling hosiery and beachwear for women, men and children, through a franchising sales network.” Currently, it has more than 2.000 shops throughout the world (in more than 24 countries). Some key factors for its success are: huge range of products, "fast fashion," particular attention paid to fashion and quality-price ratio. In addition, the Group also distinguishes itself through its advertising, with major media campaigns and selections of the best photographers and top models. Gisele Bundchen, Julia Roberts or Adriana Lima (for Calzedonia) and Irina Skayk or Blanca Suarez (for Intimissimi) are some of the models/actresses that have been the brand image of these firms.

Calzedonia, like nearly all companies in the apparel industry, has been pushed by competitors to reduce the time to market in the last years. Their selling is done exclusively in their label shops which are direct management, franchising or extern distributors. A few years ago, the company implemented IUNGO, a web platform which enables better communications between company and suppliers. This platform enables an evaluation of suppliers based on punctuality, reliability, and flexibility. IUNGO also allows Shopping

Logistics Italy the emission of temporary orders to the Shopping office in Sri-Lanka and Asian, raw materials suppliers (Purchase Order) and a Proforma Purchase Order that allows a strategy advantage of booking suppliers capacity in advance.

Calzedonia main products are: tights, stockings, leggings, socks, and beachwear. To regard where the company generates value and how it is structured, the business model canvas is depicted in the following figure.

Figure 6: *Calzedonia Business Model Canvas*

Key partners	*Key activities*	*Value proposition*	*Customer relationship*	*Customer segments*
Strong suppliers such as Italfil Experian FootFall System IUNGO	Selling quality products (beachwear, socks, tights, leggings and stockings) at an affordable price Distribution in own label shops and franchising Marketing campaigns with top models and famous photographers	Fashionable and good quality products at an affordable price. Quality-price ratio is low Made in Italy quality standards Fast fashion: changing constantly collections Discounts: basic products can be bought at a discount price, fashionable products at a lower price Customization of products Customer personalized attention at shops – own label shops with specialized personnel Generation of desire with marketing campaigns: top models wearing beachwear, tights or other products Influencers promote in social network the brand Global company: shops located in more than 24 countries and with expansion plans in mind – providing quality-price to markets where no other competitors are operating such as China or Brazil	Shops: personnel can make a customized experience Direct marketing: emailing, publicity, campaigns Customization of products Chat online, email requesting information	Mainly women of 15-55 Lately, promoting men from 25-40 Middle-class and high-class
Key resources			*Channels*	
Suppliers: quality, time to market Marketing specialists: campaigns Web developers: shop online Shops Not high amounts of stock: fashionable products			Online Channel Distribution in own label shops or franchising	
Cost structure			*Revenue streams*	
Salaries: headquarters, shops, logistics Costs: suppliers' products, manufacturing, importing taxes and shipment costs, marketing campaigns, influencers, renting of shops, buildings and franchisers' revenues			Sales of products	

The supply chain studied, socks' supply chain, is structured as follows:

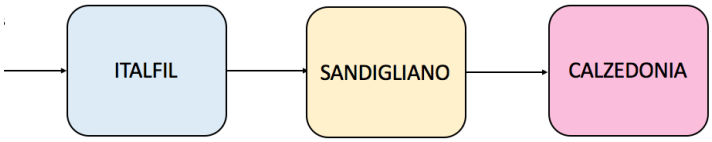

Figure 7: ***Calzedonia – socks Supply Chain***

Italfil is a small firm located in Biella. It has been in the yarns market for more than 50 years, producing high-quality worsted yarns. As they state on their website: "the utmost attention to product quality and service makes Italfil one of the world leaders in the sector." The offer customization, tailoring the yarn. They have research (machinery, equipment, methods, planning..) that allows them to innovate and adapt to market changes and customer requirements continually. One of their key points for success is flexibility: geographical closeness to partners and focus on customers allow them to minimize development time. In addition to this, they have a selection of ready-made items, guarantee rapid delivery.

Recofil is also a small firm located in Sandigliano. No further information about strategies of the company is founded but, comparing current economic data with the one available the company has suffered a reduction of turnover and number of employees. The risks considered before will be considered then, and some additional expected risks will be added.

Case 2 & Case 3: Intimissimi – underwear and Intimissimi – silk wool

On the other hand, Intimissimi, even though their final strategy of "fast fashion" can be considered similar, it has a different way of organizing its processes. Its raw materials are sourced globally, mostly in Europe and Asia, from their buying offices in Dossobuono

di Villafranca and Hangzhou (China). As Calzedonia does, they directly manufacture their own-label underwear. Other clothing (pajamas, knitwear) seems to be produced externally, due to the fact there are not their main product. It has subcontractors specialized in knitting, dyeing, and molding (for bras). There is no information on the production of their beauty products, but since cosmetics have nothing to do with their core business of underwear, we assume that it is also subcontracting them. Suppliers are very diverse concerning size from large suppliers to small local dyeing mills and from very structured to family-run businesses. Retail is an internal competence as goods are sold through mono-brand stores. It also carries out all communication and advertising activities internally without the support of an advertising agency. Since sourcing, design, manufacture (partly), retail and communication are organized internally, we can consider that is vertically integrated - reducing the risk of mismatching between the supply pipeline and consumer behavior (Thogson, 2011).

Intimissimi main products are: bras, knickers, lingerie, clothing, nightwear clothing and accessories. As in the case of Calzedonia, the business model canvas is analyzed to regarding where and how the company generates value and how it is structured.

Figure 8: ***Intimissimi Business Model Canvas***

In this case, the supply chains studied for Intimissimi are: underwear (its core business) and silk wool.

Intimissimi underwear supply chain is described in the following paragraphs.

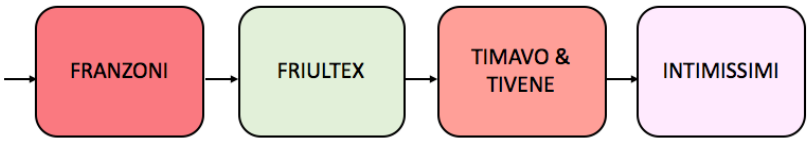

Figure 9: ***Intimissimi– underwear Supply Chain***

Franzoni and Timavo and Tivene are two companies that are facing default. Since no other information is available about the new players of this supply chain a pre-bankruptcy situation is considered where their financial weakness provides their main risks. This financial situation affects the companies considerably they supply adding new risks also to them. Regarding that the aim of the project is not perfect information, reasonable hypotheses have been taken into account.

Finally, Friultex is a small company located in Azzano Decimo, Udine that serves customers in Italy. The offer is mainly natural fabrics such as cotton, wool, micro modal, and silk. It only has around 15 employees but its turnover grows every year, and it is closed to 7 million euros. Even though it can be considered an active player in the supply chain, since 2011, their turnover has decreased by 6,5 million entailing that the company has lost position and power in this years. The assumptions in the analysis will consider this loss.

Finally, Intimissimi silk wool supply chain is described in the following paragraphs.

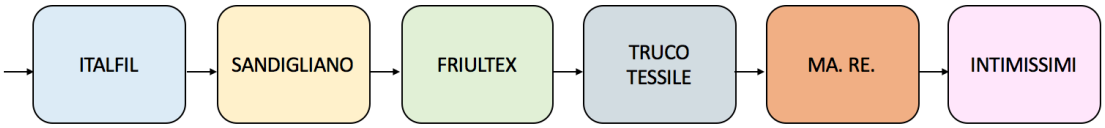

Figure 10: ***Intimissimi – silk wool Supply Chain***

The beginning of Intimissimi – Silk wool supply chain is the same as Calzedonia. Then, Friultex is the following player, also included in Intimissimi – Underwear.

Trucco Tessile is a new player in this supply chain. Boglietti (the first underwear factory in Italy and still today one of the most important companies in the production and marketing of underwear) was the player before, but Trucco Tessile acquired it in 2014. Assuming the customers are the same, they will still supply Ma.Re. in this supply chain. Truco Tessile started to sell their products internationally in the 90s, so their strategy would be mainly to grow and defend their status, and not become global as other companies may aim.

Finally, Ma. Re. is an underwear company, mainly T-shirt manufacturer located in Chions. The company sales to distributors and wholesalers. Their underwear is "Made in Italy," and high-quality with basic designs made off cotton and wool. In 2013, Armani ordered them 300 million euros of underwear.

CHAPTER 3

RESEARCH METHODOLOGY

The methodology of research that would be used is the Sampieri method (Sampieri, 1991). It is based on nine steps when the problem is qualitative (as it is in this case*): Idea, Problem approach, Initial immersion in the theme, Study design conception, Definition of the initial study sample and access to it, Data harvest, Data analysis, Interpretation of results* and *Conclusions and elaboration of the final report.*

The information available has been updated considering reasonable assumptions in case of lack of information. Financial statements, current strategic objectives and the latest news about the companies have been considered to update all the information. Some information has been more difficult to obtain, but, as aforementioned, data used is mainly second-handed due to the confidentiality of this data, that provides competitive advantages to the firms and cannot be published. The final aim of the paper is not to expose perfect information, but, with the information available, to obtain the relevant conclusions. For most of the firms, risks that were relevant in the past analysis, are still important today.

Calzedonia (socks) and Intimissimi (underwear and silk-wool) are the supply chains to analyze. Their data can exemplify a typical European supply chain. In this way, the results of the research could be broadened to other textile companies in Europe and provide guidelines for further research. The study will be carried out by updating information available of the three supply chains of study making use of two frameworks: Tang's (mitigations) and Musa's (risks) frameworks and considering the linked between Porter's Value Chain (functions) and focusing mainly in mitigations strategies where two

companies are involved collaborating or forcing other companies to apply strategies that benefit the dominant company.

Means used to solve the problem

The principal means used to carry out the analysis of the risks of the companies chosen will be:

1. Previous information from a data collected by the Politecnico di Milano: students and professors
2. Analysis of the structure of the supply chain, Business Core Functions, and Corporate Strategies
3. Quantitative data will be analyzed with Excel
4. Scientific papers
5. Internet research: newspapers, companies' websites, financial newspapers, informational websites…

Data used in these analyses are mainly second-hand. It is difficult to validate the models with real cases, for data relating to risk issues is information which is confidential to the industry. As aforementioned, the final goal of the paper is not to show perfect information about the supply chains, but to set up a method of study and research of the industry risks and mitigations from a different perspective of previous studies.

Definition of framework

The focus of the research will be on mitigations strategies that involve more than one player in the supply chain.

Musa's Supply Chain Research Framework

Musa (2012) in his dissertation explained that a supply chain could be divided into three flows: earlier Supply chain management focused on the material flows and other flows such as financial and information flows. Risk can create disruptions in either one or a combination of these flows. Similar ideas have been presented by Chopra and Sodhi (2004), Johnson (2001) and Spekman and Davis (2004), whom all identify the dimension of risk in the form of supply chain flows. The risk event can disrupt one flow or in a combination of more flows.

Material flow can be defined as the physical movement of products from suppliers to customers. Financial flows are: letters of credit, timely payment of bills, bankruptcy, payment schedules, credit terms and suppliers' contracts… And Information flows are, for example, order status, order delivery, and inventory status… The system can be considered a process model of source (supply), make (production) and deliver (demand). Decision variables such as design and control policies are determined and improved based on analyzing performance measures just as in any supply chain. Supply chain operations can be affected by various risk events which, finally, affect performance. Monitoring of performance could identify the impact of disruption on supply chains: with mitigation strategies, disruption of flows could be diminished, or even avoided.

Flows regard the connections between two different firms which provide a framework for the case of study - mitigations where two firms are involved.

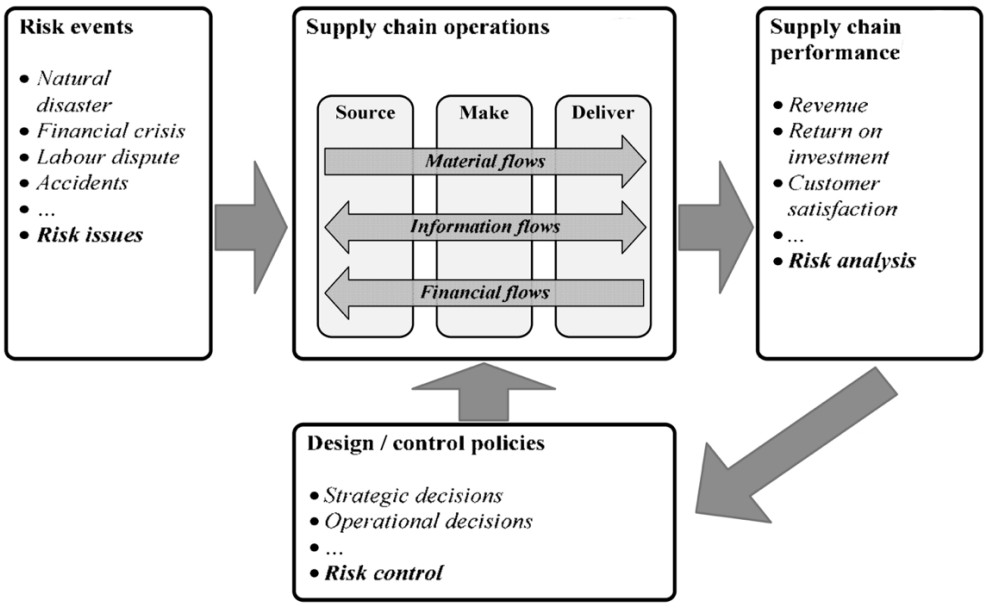

Figure 11: ***Musa's Supply Chain Research Framework. Source: Musa, 2012***

The system can be considered a process model of source (supply), make (production) and deliver (demand). Decision variables such as design and control policies are determined and improved based on analyzing performance measures just as in any supply chain. Supply chain operations can be affected by various risk events which, finally, affect performance. Monitoring of performance could identify the impact of disruption on supply chains: with mitigation strategies, disruption of flows could be diminished, or even avoided.

The following risks will be considered depending on each different flow:

1. **Material flow risk:**
    a. ***Source:*** Sourcing involves the acquisition of physical products or services. This segment will cover: *single sourcing risk, sourcing flexibility risk, supplier selection/outsourcing, supply product monitoring/quality risk* and *supply capacity risk*.
    b. ***Make:*** *Product and process design risk, production capacity risk,* and *operational disruption risk*.

c. ***Deliver:*** demand uncertainties are still the primary problem discussed in the supply chain. The significant issues are: *demand volatility/seasonality balance of unmet demand and excess inventory* and *inventory obsolescence* (linked to rapid changes in technology and changes in customer demand).

d. ***Supply chain scope:*** In the above subsections, we focus on elements of the supply chain operations. These issues are associated with supply chain scopes: *logistics, price volatility of commodity and alternative energy, environmental degradation and awareness, political risk, culture and ethics* and *Supply chain partners' relationships*.

2. **Financial flow risk or cash flow risk:** financial flow represents the received and spent cash streams. Disruption in financial flow involves the inability to settle payments and improper investment. The issues considered are: *exchange rate risk, price and cost risk, the financial strength of supply chain partners* and *financial handling/practice*.
3. **Information flow risk:** Information often triggers Value-adding activities in a supply chain flows such as demand information, inventory status and order fulfillment. Product and process design changes and capacity status are other examples of information flows. Information flow may also be the bonding agent between material flow and the financial flow. Hence cash will flow in the opposite direction of the material flow. The following risk issues of information flows will be considered: *information accuracy, information system security and disruption, intellectual property* and *information outsourcing risk*.

The main mitigations studied are mitigations where two firms are involved. This framework allows regarding the connections between them: flows. These flows are the way firms interact, and they are the basis to consider one mitigation or another one.

Tang's Framework

Tang (2006) classifies the Supply chain risk management problem in four different macro sources:

Table 15: ***Tang classifications of the Supply chain risk management problem. Source: Tang, 2006***

Classification	Description
Supply Management	Classified in five issues: *Supply network design, Supplier relationship (*vertical integration, sharing information…), *Supplier selection process, Supplier order allocation* (uncertain demands, uncertain yields, uncertain supply lead times, uncertain supply costs and uncertain supply capacity*)* and *Supply contracts*.
Demand Management	Strategies to control demands dynamically to avoid a mismatch with the capacity and mitigate risks. So, the different strategies considered are: *Shifting demand across time* (revenue management and seasonal demand management: capture customers in different segments who are willing to pay different prices in different moments in time), *Shifting demand across markets* and *Shifting demand across products*
Product Management	Product variety leads to increased manufacturing complexity and cost (trade-off between them to maximize profits). The ways considered to reduce uncertainty are *Postponement strategy* (modular design) and *Process sequencing* (reversing the sequence of manufacturing processes in the supply chain).
Information Management	Fisher classification of information strategies will be considered: *Strategies for fashion products* (reduce inventory level) and *Strategies for functional products* (longer life cycles – market

information is critical for generating an accurate demand forecast).

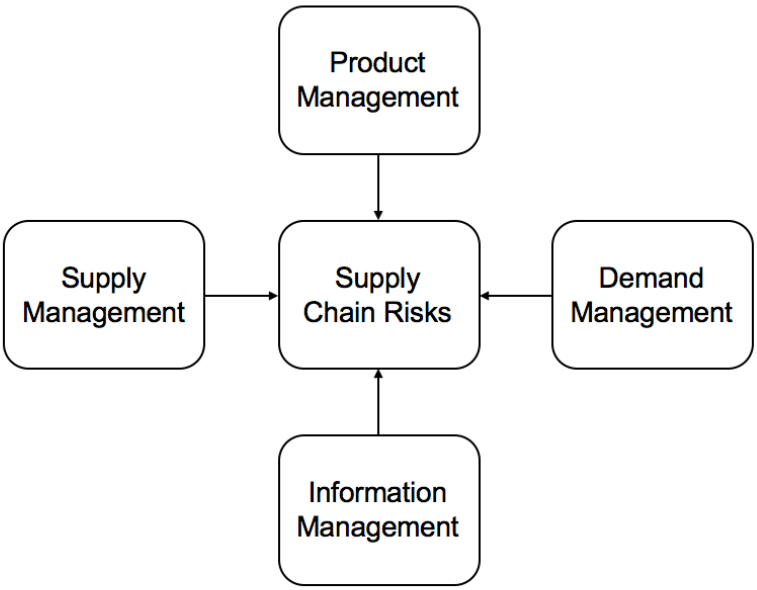

Figure 12: ***Tang's Supply Chain Research Framework. Source: Tang, 2006***

Supply chain management is about matching supply and demand which is linked to inventory management: too much supply leads to inefficient capital investment and costs, while too much demand generates the opportunity cost of lost margins. Each situation is the consequence of one of two types of inventory risk: risk of excessive inventory (Inventory risk) or the risk of insufficient supply (Supply risk). Because most supply chains are incapable of perfectly matching supply and demand, all of the firms in a supply chain bear at least some supply risk (Cachon, 2004). Tang with its classification includes mitigations strategies for both risks: supply management and demand management.

Porter's Value Chain Model

Porter's Value Chain Model is a strategic tool used to understand how does a company generate value. He described this model in his book (1985) "Competitive

Advantage." Each different industry creates value with a particular process. For example, manufacturing companies create value by acquiring raw materials and producing something useful for the customer. This value is captured by the company's profit margin: *Value created and captured – Cost of creating that value = Margin.* So, the profitability of the company is linked to the value it can produce. This knowledge of where the company is creating value turns out to be a competitive advantage for the company. Porter defined a set of activities that an organization carries out to create value for its customers: value chain. These activities can be examined to observe where the value is being created: where are the costs and how they affect the profits.

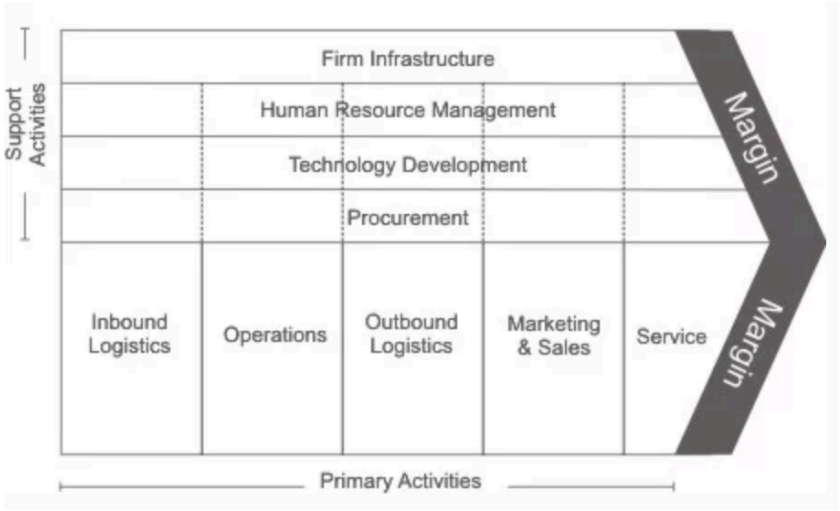

Figure 13: ***Porter's Generic Value Chain. Souce: Porter, 1985***

Trying to fulfill the strategic questions of the project, Porter's Value Chain will be linked with the risks and mitigations of the studied companies. In this way, there is a correlation between Supply chain risk management and the value creation for the customer.

Competitive advantage grows out of value a firm can create for its buyers that exceed the firm's cost of creating it. Value is what buyers are willing to pay, and superior value stems from offering lower prices than competitors for equivalent benefits or providing

unique benefits that more than offset a higher price (Porter, 1985). The functions that a company needs to create value are: *Firm infrastructure, Human resources management, Technology, Procurement, Inbound Logistics, Operations, Outbound logistics, Marketing & Sales,* and *Service.*

Dittman Classification of Risks

Dittman classified risks in two main blocks: risks belonging to the supply chain (Levels 1-3) and risk not belonging but supporting the supply chain (Level 4) providing a classification that can regard the nature of the risk.

1. **Level 1 - Operational Risks**: Relate to inherent process risks. *Develop, Plan, Source (Supply Risk), Make (Production Risk), Deliver/Return (Demand Risk)…*
2. **Level 2 - External Value Chain Risks:** Originate in upstream and downstream supply chain partners. *Distributors, End Users, Third Parties Services, Tier 1…Tier N…*
3. **Level 3 - Macro Environment Risks:** Have potential effects across the entire supply chain. *Economic, Environmental/Social responsibility, Geopolitical, Hazards, Infrastructure/Resources, Regulatory, Security…*
4. **Level 4 – Functional Risks:** Exist among enabling functions that support supply chain's processes. *Finance, Legal, Human Resources, Information Technology, Strategy, Fiscal, Regulatory, Asset impairment, Reputational, Customers…*

Risks classification in supply networks

Another classification of risks in supply chains is the one proposed by Harland, Brenchley, and Walker in their article: "*Risk in supply networks"* (2003), depicted in table 16.

Table 16: ***Brenchely et al. (2003) classification of risks***

Classification	Description	Authors
Strategic risk	Affects business strategy implementation	Simons (1999)
Operations risk	Affects a firm's internal ability to produce and supply goods/services	Simons (1999) and Meulbrook (2000)
Supply risk	Adversely affects the inward flow of any resource to enable operations to take place	Meulbrook (2000)
Competitive risk	Affects a firm's ability to differentiate its products/services from its competitors	Simons (1999)
Reputation risk	Erodes the value of whole business due to loss of confidence	Schwartz and Gibb (1999)
Financial risk	Exposes a firm to potential loss through changes in financial markets; can also occur when specific debtors default	Meulbrook (2000)
Fiscal risk	arises through changes in taxation	Meulbrook (2000)
Regulatory risk	exposes the firm to changes in regulations affecting the firm's business, such as environmental regulation	Meulbrook (2000)
Legal risk	exposes the firm to litigation with action arising from customers, suppliers, shareholders or employees	Meulbrook (2000)
Customer risk	Affects the likelihood of customers placing orders; grouped with factors such as product obsolescence in "product/market risk."	Meulbrook (2000)

Asset impairment risk	Reduces utilization of an asset and can arise when the ability of the asset to generate income is reduced	Simons (1999)

For some further analysis, this classification is useful to regard how strategic, financial or competitive risks are being mitigated. The correlation between this classification and mitigation classification will unlock exciting conclusions. In addition, the link between this classification and the current risks occurrence and exposure could evince the strategy to follow.

Final framework

The final framework is a mixture of the frameworks described before and with the same structure of Musa's framework. Dittman classification will provide a classification of risks based on levels, Porter is used to measuring strategy fulfillment, and the link with company's functions and Tang provides a framework of the necessary mitigations strategies for the supply chain operations.

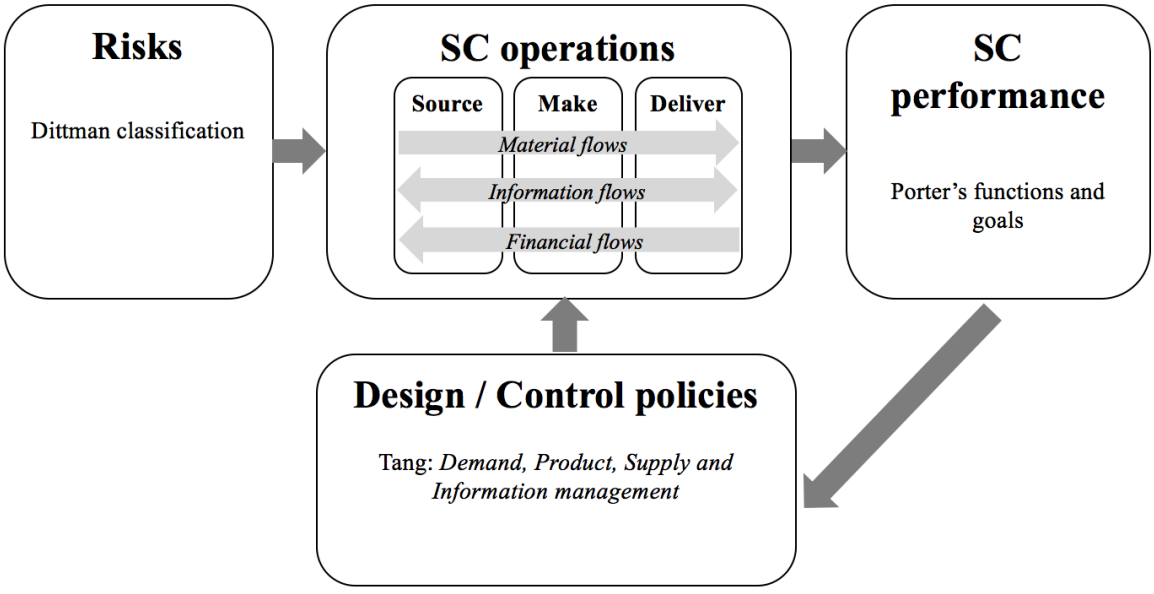

Figure 14: ***The final framework***

Research Questions

The objective of the study is to develop a deeper understanding of the different mitigations strategies where two firms are involved. A better comprehension of risks and how players are acting in the supply chains should be studied. The fact that one of the partners assumes a dominant role cannot be ignored (Gupta, 2009). The non-dominant players will optimize their objectives under the constraints imposed by the dominant members even though specific optimization may not be efficient for the supply chain as a whole (Gupta, 2009). The other dimension considered is cooperation and collaboration.

Correlation between mitigations of interest and other variables such as firm size, firm functions or financial strength will be considered to regard the generation of value these strategies could bring to the different companies in the supply chain.

Finally, the final aim of the study is to broaden the analysis to European textile companies with strategic proposals. With these objectives, the following research questions are raised.

RQ1: *How do textile companies mitigate supply chain risks?*

RQ2: *How acts the leader in a supply chain? Is it powerful enough to influence on supply chain companies' decisions?*

RQ3: *How do Supply chain to Supply chain passive or cooperative could improve the reputation, financial position, market power…of a company? (Benefits from this kind of risks mitigation)*

RQ4: *In what variables does Supply Chain to Supply Chain mitigations strategies influence?*

RQ5: *Strategic proposals for European textile companies based on their risks and current mitigation strategies.*

The Variables and Classifications

Risks

Risk Classification in Musa's Framework

Dittman risk classification would be combined with Musa's framework.

Table 17: Musa's Risks in Dittman Classification

Level 1: Operational Risks	Level 2: External Value Chain Risks	Level 3: Macro Environment Risks	Level 4: Functional Risks
Material flow risks: • *Source: single sourcing, sourcing flexibility, supplier selection/outsourcing, supply product monitoring/quality and supply capacity risks.* • *Make: product process and design, production capacity and*	**Material flow risks:** • *SC Scope: SC partners' relationships risk* **Financial flow risks:** • *The financial strength of SC partners risk* **Information flow risks:** • *Information accuracy risk*	**Material flow risks:** • *SC Scope: alternative energy, environmental degradation, and awareness, political, culture and ethics risks* **Financial flow risks:**	**Material flow risks:** • *SC Scope: key customer absence risk* **Financial flow risks:** • *Price and cost risk* • *Financial handling/practice risk*

operational disruption risks. • *Deliver: demand volatility/seasonality balance of unmet demand and excess inventory and inventory obsolescence risks.* • *Supply Chain Scope: price volatility of commodity risks.*	• *Information system security and disruption risk* • *Information outsourcing risk*	• *Exchange rate risk*	**Information flow risks:** • *Intellectual property risk*

Some additional or more concrete risks were considered in the supply chains studied classifying them in the same way as before. In the following table, these risks and their classification is depicted.

Table 18: ***Additional Risks in Dittman-Musa Classification***

Level 1: Operational Risks	Level 2: External Value Chain Risks	Level 3: Macro Environment Risks	Level 4: Functional Risks

Material flow risks:	**Material flow risks:**	**Material flow risks:**	**Financial flow risks:**
• *Make:* *human resources renewal, human resources group dynamics, fashion collection design, reduction of raw materials variety, learning new tools/task, raw materials procurement, raw materials costs, new machinery and spare parts for old machinery search, bottleneck machinery, arrest machinery, machinery innovation, production innovation absence and changing brand risks* • *Deliver:* *planned orders reduction risk*	• *Supply Chain Scope:* *shipment delays, shipment costs, shipment risks, supplier delays, substitutability, mistakes in large orders, and SC interruption risks*	• *Supply Chain Scope:* *industrial district absence, old infrastructure, international regulations and shipments, importation taxes and industrial accident risks* **Financial flow risks:** • *Government instability risk* • *Economic crisis risk* • *Environmental disruptions risk* • *Theft risk*	• *Financial exposition risk* • *Ecological regulations risk* • *Nonpayment risk*

- *Supply Chain Scope: a key person or technical person missing risks*

Concluding risk classification, a matrix that provides a mixture of Dittman's classification and Musa's classification is done. Both frameworks are similar which provides a classification of risks that will allow further structuring of the risks and its mitigations and a link to Porter's framework.

Supply Chain Risk Management

Risk management requires assessment of uncertain events and circumstances. The risk assessment should be done by answering to the following questions: how likely the uncertainty is to occur (*probability*), what the effect would be if it happened (*impact*) and how important is it for the supply chain (*relevance*). These three variables would be measured with the information available about the company involved.

Mitigations

The mitigations' strategies will fall into Tang's frameworks.

Mitigations Classification in Tang's Framework

Regarding the first classification of mitigations, it is combined with Tang's classification of Supply chain risk management points.

Table 19: ***Mitigations Classification in Tang's Framework***

EE	ESC	SCSC passive	SCSC active

Supply Management: • *Supplier network design* • *Supplier selection process* • *Supplier order allocation* **Demand Management:** • *Shifting demand across time* • *Shifting demand across markets* • *Shifting demand across products* **Product Management:** • *Postponement strategy* • *Process sequencing* **Information Management:** • *Strategies for fashion products*	**Supply Management:** • *Supplier network design* • *Supplier selection process* • *Supplier order allocation* **Demand Management:** • *Shifting demand across time* • *Shifting demand across markets* • *Shifting demand across products* **Product Management:** • *Postponement strategy* • *Process sequencing* **Information Management:** • *Strategies for fashion products* • *Strategies for functional products*	**Supply Management:** • *Supplier relationship* • *Supplier selection process* • *Supplier order allocation* • *Supply contracts* **Demand Management:** • *Shifting demand across time* **Product Management:** • *Process sequencing*	**Supply Management:** • *Supplier relationship* • *Supplier selection process* • *Supplier order allocation* • *Supply contracts* **Demand Management:** • *Shifting demand across time* • *Shifting demand across markets* • *Shifting demand across products* **Product Management:** • *Postponement strategy* • *Process sequencing* **Information Management:** • *Strategies for fashion products* • *Strategies for functional products*

- *Strategies for functional products*

Supply Chain and Firm Goals and Strategies to Achieve the Goal

The strategy classification will be based on Porter's paper: Competitive advantage (1985). This information would provide a classification of goals useful for the last question of the research: strategic proposals for European textile companies. For Porter: "*competitive advantage grows out of value a firm can create for its buyers that exceed the firm's cost of creating it. Value is what buyers are willing to pay, and superior value stems from offering lower prices than competitors for equivalent benefits or providing unique benefits that more than offset a higher price. There are two basic types of competitive advantage: cost leadership and differentiation."*

The following figure (Figure 15) can be considered a menu for companies: it shows the different positions where they can settle in their industry. Companies must choose between the type and scope of competitive advantage they are willing to pursue.

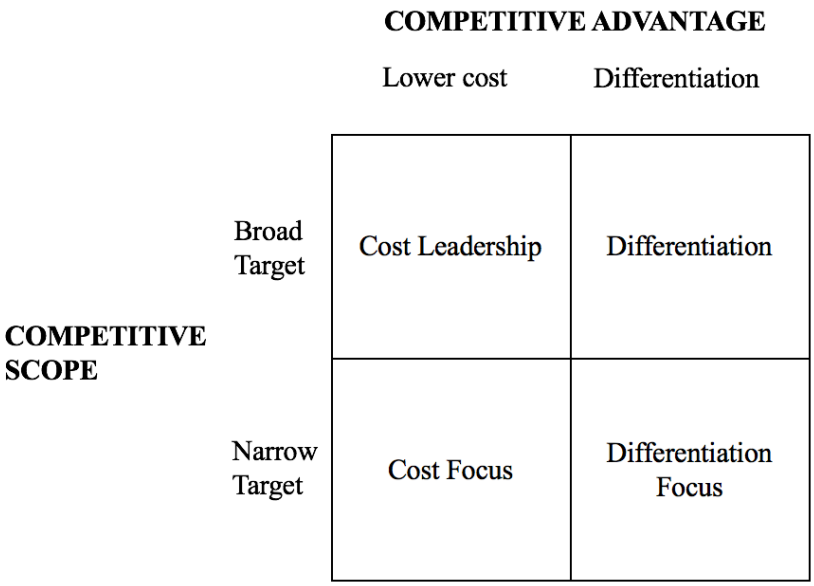

Figure 15: ***Porter's Generic Strategies. Source: Porter, 1985***

1. **Cost Leadership Strategy:** the firm wins market share by targeting price-sensitive customers by having the lowest prices in the market segment or the lowest price to value ratio. The firm must be able to operate at a lower cost than its competitors (*economies of scale and experience curve effects, standardize products or control costs over the value chain*) to succeed while still achieving profitability and high return on investment. Cost leadership strategies are only viable for large firms with the opportunity to enjoy economies of scale and large production volumes and significant market share. On the other hand, these strategies may have the disadvantage of lower customer loyalty, as customers will change to another company is there is a lower-priced substitute available.
2. **Differentiation:** differentiate the products/services in some way to compete successfully. Successful differentiation is displayed when a company accomplishes either a premium price for the product or service, increased revenue

per unit, or brand loyalty. As happened with cost leadership strategies, differentiation strategy is not suitable for small companies.

3. **Focus:** the company focuses on a few target markets (niche strategy). If it chooses a differentiation or cost focus strategy it will depend on the segment it is focusing in. It is an appropriate strategy for small companies especially for those wanting to avoid competition with big one.

Porter's first classification of firms' goals is: *Competitive advantage, Cost advantage, Market dominance, New product development, Contraction/Expansion, Price leadership, Global, Reengineering, Downsizing, Delayering,* and *Restructuring*

To consider how companies work and try to achieve the previous goals, the following classification of strategies to achieve the goal (Porter, 1985) would be considered: *Grow fast, Grow in line with the industry, Defend existing status, Catch up, Turn around, Hang in* and *Harvest.*

Functions

As aforementioned, the function classification is from Porter's framework. The classification would be as follows: *Firm infrastructure, Human resources management, Technology, Procurement, Inbound Logistics, Operations, Outbound logistics, Marketing & Sales,* and *Service.*

Firm size

For this variable, the European classification would be used:

1. **Small and medium-sized enterprises (SMEs):** less than 250 people employed. The subdivision of these companies is:
    a. ***Microenterprises:*** less than ten employees

b. ***Small enterprises:*** ten to forty-nine employees

c. ***Medium-sized enterprises:*** fifty to two hundred and forty-nine employees

2. **Large Enterprises:** two hundred and fifty or more people employed.

Firm activity

To distinguish the activity the company is carrying out in the supply chain, they would be classified between:

1. **Basic manufacturing:** *raw materials and transformation* - conversion of fiber into yarn and yarn into fabric
2. **Basic material transformation:** *manufacturing and customization* **-** dying or printing and fabrication of clothes.

Substitutability

Measuring this firm characteristic could be necessary when determining the strategy of the supply chain or the dominant player in the supply chain. Making a simile with the Resource-based view (Barney, 1991), a firm can be considered a strategic resource for the supply chain. The Resource-based view is a framework used to determined strategic resources with the potential to deliver comparative advantage to a firm. The four main characteristics a resource must own to be considered a strategic resource are: *valuable, rare, imitable and organized to capture value (firm)*. If these four conditions are fulfilled, the resource could be considered non-substitutable and vice versa. So, firms would be classified considering this simile: *Substitutable* and *Non-substitutable firms.*

IT Level

For strategic reasons as before, the IT level of a firm would be considered. The classification would be as follows: *Very high, High, Medium* and *Low.*

Integration

The definition of supply chain integration is: *"how everyone in the company and its trading partners work in sync to achieve the same business objectives via integrated business process and information sharing.*" The number of firms in a supply chain is a negative factor for integration: the higher number of firms in a supply chain, the less probability of being an integrated supply chain. So, if the supply chain is composed of less than four firms, the supply chain integration is considered and, if there are more than four firms, the supply chain integration is not possible.

In an integrated supply chain, all parties should benefit from the relationship on a sustainable, long-term basis entailing partnerships with extensive and open communications. In this way, there is a closed relationship between the mitigations considered and the strategies that could be proposed based on this information.

Information Sharing

Since information sharing is vital for integration and the mitigations of interest in this research, firms would be classified as the ones that share information through the supply chain and the ones that do not.

The Sample

The sample is the three defined cases: Calzedonia-socks, Intimissimi-underwear, and Intimissimi-silk wool supply chains. As abovementioned in *Chapter 2: Motivation*, these firms are chosen due to the fact they have an apparent dominant player in each supply chain (Calzedonia and Intimissimi respectively) and regarding they are one of the best performers in the Italian textile industry. This fact will provide a broad view of the risks and mitigations of the industry allowing further conclusions about their mitigations Supply

chain to supply chain, how they are managing their internal relationships and answers to the research questions.

Data harvest

The information available has been updated considering reasonable assumptions in case of lack of information. Financial statements, current strategic objectives and the latest news about the companies have been considered to update all the information. Some information has been more difficult to obtain, but, as aforementioned, data used is mainly second-handed due to the confidentiality of this data, that provides competitive advantages to the firms and cannot be published. The final aim of the paper is not to expose perfect information, but, with the information available, to obtain the relevant conclusions.

For most of the firms, risks that were relevant in the past analysis, are still important today. The Italian textile industry is weaker than it was in the past which makes companies face more risks. Some risks such as government instability (current Italian situation) or economic crisis are included. Two firms are currently facing bankruptcy: *Timavo & Tivene* and *Franzoni*. For their analysis, a pre-bankruptcy situation is considered where their financial weakness provides their main risks and affects the companies considerably they supply adding new risks. Regarding that the aim of the project is not perfect information, reasonable hypotheses have been taken into account.

CHAPTER 5

DATA ANALYSIS & INTERPRETATION OF RESULTS

As abovementioned, some data would not be close to reality but, with the information available and the research carried out, the information considered is the better obtained.

Firms' basic information

Some basic information about the companies involved in the supply chains is studied. The following results will be divided into the three different supply chains.

Table 20: ***Intimissimi – Silk wool basic information***

No. in Supply Chain	Firm	Size	No. Employees	Turnover (M€)	Turnover / Employees (M€/No.)	Role	Info. Sharing
1	Italfil	Small	45	6,9	0,15	Basic Manufacturing	Yes
2	Sandigliano	Small	40	1,5	0,04	Basic Manufacturing	Yes
3	Friultex	Small	16	7,2	0,45	Basic Manufacturing	Yes
4	Truco Tessile	Medium	99	13,0	0,13	Basic Material Transformation	Yes
5	Ma. Re.	Medium	60	4,4	0,07	Basic Material Transformation	Yes
6	Intimissimi	Large	8125	665,0	0,08	Basic Material Transformation	No

Table 21: ***Intimissimi – Underwear basic information***

No. in Supply Chain	Firm	Size	No. Employees	Turnover (M€)	Turnover / Employees (M€/No.)	Role	Info. Sharing
1	Franzoni	Medium	83	34,0	0,41	Basic Manufacturing	No
2	Friultex	Small	16	7,2	0,45	Basic Manufacturing	Yes
3	Timavo & Tivene	Medium	110	17,5	0,16	Basic Manufacturing	Yes
6	Intimissimi	Large	8125	665,0	0,08	Basic Material Transformation	No

Table 22: ***Calzedonia– Socks basic information***

No. in Supply Chain	Firm	Size	No. Employees	Turnover (M€)	Turnover / Employees (M€/No.)	Role	Info. Sharing
1	Italfil	Small	45	6,9	0,15	Basic Manufacturing	Yes
2	Sandigliano	Small	40	1,5	0,04	Basic Manufacturing	Yes
3	Calzedonia	Large	14625	705,0	0,05	Basic Material Transformation	No

Risks and mitigations

The following results provide a global overview of risks founded and their occurrence the supply chains studied.

Table 23: ***Risk occurrence***

Risk	Occurrence	Risk	Occurrence

Economic crisis	4,1 %	Shipment risks	1,6 %
Government instability	4,1 %	Planned orders reduction	1,6 %
Theft	3,8 %	International regulations	1,6 %
Raw materials procurement	3,8 %	Nonpayment	1,6 %
Human Resources group dynamics	3,5 %	Importation taxes	1,6 %
Information outsourcing	3,5 %	Old infrastructure	1,3 %
Information system security and disruption	3,5 %	Supply chain partners' relationships	1,3 %
Industrial district absence	3,2 %	No information sharing	1,3 %
Information accuracy	2,9 %	The financial strength of supply chain partners	1,3 %
Supply product monitoring/quality	2,9 %	Spare parts for old machinery	1,0 %
Seasonal demand	2,9 %	Supplier selection/outsourcing	1,0 %
Mistakes on large orders	2,9 %	Product innovation absence	1,0 %
Supply chain interruption	2,5 %	Intellectual property	1,0 %
Substitutability	2,5 %	Operational disruption	1,0 %
Key person absence	2,5 %	International shipment delays	1,0 %
Supplier delays	2,5 %	Changing brand	1,0 %
Shipment costs	2,2 %	Financial handling/practice	1,0 %
Ecological regulations	2,2 %	Key customer absence	1,0 %
Price and cost	2,2 %	Product process and design	1,0 %
Arrest machines	2,2 %	Exchange rate	0,6 %
Human Resources renewal	2,2 %	Sourcing flexibility	0,6 %
Raw material costs	2,2 %	Culture and ethics	0,6 %
Financial exposition	1,9 %	Environmental disruptions	0,6 %
Machines innovation	1,9 %	Shipment delays	0,6 %
Fashion collection design	1,6 %	Technical person absence	0,6 %

Search of new machinery	1,6 %	Industrial accident	0,3 %
Bottleneck machinery	1,6 %	Learning new tools/tasks	0,3 %

There are 54 risks considered in the three supply chains. None of them is in a significant proportion, which makes the results more appealing due to the fact they are heterogeneous. In addition, a 4% could be considered a significant percentage regarding that there are more than 50 different risks.

Risks such as *Economic crisis* or *Government instability* affect all the firms considered – their exposure will vary depending on the financial strength of each company and the long-term planning established in each one forecasting these risks. *Theft* is another risk that can be present in nearly every company. Despite owning security measures, firms with machinery are always an easy target.

On the other hand, risks such as *Raw materials procurement, Human Resources group dynamics, Information outsourcing* and *Information system security and disruption* are more specific to the company, and it is dangerous that they appear in enormous proportions in the supply chain if their exposure or damage is also significant. This relationship will be studied on the following points.

Table 24: ***Mitigations occurrence***

Mitigations	**Occurrence**	**Mitigations**	**Occurrence**
Long-term relationship	11,7 %	Product innovation	1,2 %
No mitigations available	10,4 %	In-house repair shop	1,2 %
Long-term planning	9,7 %	Safety fund	1,2 %
Information sharing	7,9 %	Spare warehouse	1,2 %
Quality control	5,0 %	Marketing	1,2 %
Raw materials warehouse	4,0 %	Stylist	0,7 %

Customer selection	4,0 %	Buy a new machine	0,7 %
Pull contract	4,0 %	More suppliers	0,7 %
Differentiation	3,5 %	Sorting and shipping yard	0,7 %
Supplier selection	3,5 %	Reach standards	0,7 %
Outsourcing	3,2 %	New management	0,7 %
Closed contract	2,7 %	Discounts	0,5 %
Theft insurance	2,7 %	Training	0,5 %
Professional integration	2,5 %	Plant renewal	0,5 %
Process innovation	2,2 %	Partnership	0,5 %
Self-owned transportation	2,0 %	Determining operation exposure	0,5 %
Certification	1,7 %	Supplier order allocation	0,5 %
Buyer's option	1,7 %	Market knowledge	0,5 %
Continuous maintenance	1,5 %	Credit insurance	0,2 %
Freight insurance	1,5 %	Security protocols and measure	0,2 %

There are 39 mitigations identified. Regarding the risks considered, the main mitigations strategies in the textile industry are studied. *Long-term relationships, Long-term planning*, and *Information sharing* are the most common ones. Two of these mitigations strategies imply more than one company in the supply chain. The relationship between will be studied in the analysis to regard if it is a dominant-passive relationship or a collaborative-partnership relationship.

Risks and mitigations strategies

Mitigations and risks are very assorted in the supply chains of study. There is no main risk or mitigation strategy concerning occurrence while considering exposure the

main risks are: *Arrest machinery, Financial handling/practice, Government instability, Product, process and design, Supplier selection/outsourcing* and *Substitutability*.

Table 25: ***Summary of results – Mitigations and risks***

Risk	Mitigations	Occurrence	Exposure
Arrest machinery	Continuous maintenance	0,2%	16
	Customer selection	0,5%	2
	Information sharing	0,2%	4
	In-house repair shop	0,5%	2
	Outsourcing	0,2%	16
	Process innovation	0,2%	2
	Spare warehouse	0,5%	2
Bottleneck machine	Buy new machine	0,7%	4
	No mitigation available	0,5%	1
Changing brand	Long-term planning	0,7%	4
Culture and ethics	Market knowledge	0,5%	4
Ecological regulations	Certification	1,0%	4
	Reach standards	0,7%	4
Economic crisis	Long-term planning	1,0%	6
	Long-term relationship	2,2%	8
Environmental disruptions	Long-term relationship	0,5%	2
	Process innovation	0,5%	2
Exchange rate risk	Determining operation exposure	0,5%	3
Fashion collection design	Stylist	0,5%	2
	Supplier selection	0,7%	2
Financial exposition	Customer selection	1,2%	1
	Supplier selection	0,7%	2
Financial handling/practice	New management	0,7%	20
The financial strength of supply chain partners	Information sharing	1,0%	8
Finding new machinery	No mitigation available	1,2%	1

Government instability	Long-term planning	3,2%	12
Human resources group dynamics	Continuous maintenance	0,5%	1
	No mitigations available	2,2%	4
Human renewal	Professional integration	1,0%	6
	Quality control	0,5%	1
	No mitigations available	0,2%	3
Importation taxes	No mitigations available	1,2%	4
Industrial accident	Security protocols and measure	0,2%	1
	Training	0,2%	1
Industrial district missing	Information sharing	2,0%	2
	No mitigations available	0,5%	6
Information accuracy	Long-term relationship	2,2%	8
Information outsourcing	Closed contract	2,7%	9
Information system security and disruption	Outsourcing	2,7%	8
Intellectual property	Certification	0,7%	1
International regulations	No mitigations available	1,2%	4
International shipment delays	Sorting and shipping yard	0,7%	4
	Supplier selection	0,7%	4
Key customer absence	Buyer's option	0,5%	4
	Differentiation	0,7%	3
Key employee absence	Professional integration	0,5%	2
	No mitigation available	1,5%	2
Machinery innovation	Long-term relationship	1,0%	2
	Long-term planning	0,2%	4
	No mitigations available	0,7%	5
Mistakes on large order	Quality control	2,2%	8
No information sharing	Information sharing	1,0%	6
Old infrastructure	Continuous maintenance	0,7%	3
	In-house repair shop	0,7%	3

	Plant renewal	0,5%	3
Operational disruption	Process innovation	0,7%	16
Planned orders reduction	Customer selection	1,2%	8
	Differentiation	1,2%	8
	Information sharing	1,2%	8
	Marketing	1,2%	8
	Safety fund	1,2%	8
Price and cost	Long-term planning	1,7%	5
Product innovation absence	Long-term relationship	0,7%	2
Product, process and design	Process innovation	0,7%	15
	Product innovation	0,7%	15
Raw material costs	Buyer's option	1,2%	5
	Raw material warehouse	1,7%	4
Raw materials procurement	Long-term planning	0,7%	4
	More suppliers	0,2%	2
	Professional integration	0,5%	1
	Pull contract	2,0%	3
	Raw materials warehouse	1,5%	4
	Supplier order allocation	0,5%	2
	Supplier selection	1,2%	4
Supply chain interruption	Long-term relationship	1,0%	5
	No mitigations available	1,0%	5
Seasonal demand	Discounts	0,5%	4
	Information sharing	2,0%	4
	Long-term planning	1,2%	5
	Long-term relationship	0,5%	3
	Pull contract	2,0%	4
Shipment costs	Own transport	1,7%	3
Shipment delays	Long-term planning	0,2%	4
	Outsourcing	0,2%	4
Shipment risks	Freight insurance	1,2%	2

	Own transport	0,2%	2
Sourcing flexibility	Information sharing	0,5%	4
	Long-term relationship	0,5%	4
	More suppliers	0,5%	4
	Partnership	0,5%	4
Spare parts for old machinery	Spare warehouse	0,7%	2
Supplier delays	Differentiation	1,2%	2
	Long-term planning	0,5%	2
	Raw materials warehouse	0,7%	2
	Supplier selection	0,2%	2
Supplier selection/outsourcing	Long-term relationship	0,7%	10
Supply chain partners' relationships	Long-term relationship	1,0%	8
Supply product monitoring/quality	Quality control	2,2%	6
Substitutability	Differentiation	0,2%	16
	Long-term relationship	1,2%	4
	Product innovation	0,5%	12
Technical person absence	Professional integration	0,5%	2
Theft	Freight insurance	0,2%	3
	Theft insurance	2,7%	2
No payment received	Credit insurance	0,2%	3
	Customer selection	1,0%	2

Based on the abovementioned results, the following proposition is stated (to be investigated with further research):

Proposition 1: Proposal of different mitigations strategies for the risk of higher exposure

Mitigations classification

Regarding the classification of mitigations, the mitigation's occurrence is as follows:

Table 26: ***Classification of mitigations' occurrence***

Mitigations classification	Occurrence
EE	32,5%
ESC	26,7%
SCSC Cooperative	25,8%
SCSC passive	15,0%

Regarding this data, nearly 60% are Enterprise mitigations, but there is a considerable 40% of supply chain mitigations that will be studied in more detail in the paper. Usually, these mitigations are not considered, since they are less intuitive and more difficult to measure their impact. This research will focus on them, trying to discover correlations with the variables and frameworks considered and unearthing these mitigations strategies.

Enterprise to enterprise mitigations

Regarding each category more deeply, a detailed analysis mitigations' occurrence will be carried out. Firstly, Enterprise to enterprise mitigations are studied.

Table 27: ***Enterprise to enterprise mitigations' occurrence***

EE	Occurrence	EE	Occurrence
Raw material warehouse	11,1%	Buy a new machine	2,6%
Theft insurance	9,4%	Differentiation	2,6%
Long-term planning	8,5%	New management	2,6%
Self-owned transportation	6,9%	Process innovation	2,6%
Professional integration	6,8%	Reach standards	2,6%
Certification	6,0%	Sorting and shipping yard	2,6%
Continuous maintenance	5,1%	Spare warehouse	2,6%
Freight insurance	5,1%	Human resources renewal	1,7%
In-house repair shop	4,3%	Buyer's option	1,7%
Safety fund	4,3%	Customer selection	1,7%

Marketing	4,3%	Plant renewal	1,7%
Stylist	2,6%	Training	0,9%

Enterprise to supply Chain mitigations

Enterprise to supply Chain mitigations strategies are considered in the following table.

Table 28: ***Enterprise to supply chain mitigations' occurrence***

ESC	Occurrence	ESC	Occurrence
Long-term planning	30,2%	Professional integration	2,1%
Quality control	18,8%	Determining operation exposure	2,1%
Customer selection	14,6%	Spare warehouse	2,1%
Process innovation	6,3%	Market knowledge	2,1%
Differentiation	5,2%	Discounts	2,1%
Buyer's option	5,2%	Credit insurance	1,0%
Raw materials warehouse	3,1%	Information sharing	1,0%
Product innovation	3,1%	Security protocols and measure	1,0%

Supply Chain to supply chain cooperative

Supply chain to supply chain cooperative mitigations strategies are – with Supply chain to supply chain passive mitigations – the focus of the study.

Table 29: ***Supply chain to supply chain cooperative mitigations' occurrence***

SCSC Cooperative	Occurrence
Long – term relationship	41,9%
Information sharing	33,3%
Outsourcing	14,0%
Differentiation	5,4%

Partnership	2,2%

The results are not as expected. Usually, when these mitigations are considered, *Partnership mitigation strategy* is one of the first ones to be mentioned. In this case, it is the last one in occurrence. Sharing information or establishing a long-term, stable relationship with suppliers seems to be more effective in these companies. A long-term relationship is like a partnership, but, the partnership is a stronger relationship - usually with contracts that entail rights and responsibilities between the companies. On the other hand, building a long-term relationship is difficult: it must be trusty, open, mutually dependent, respectful and transparent to benefit both parts. This relationship leads to the second strategy most used in these supply chains: *Information sharing*. Information sharing is crucial to establish the abovementioned relationships. The long-term relationship characteristics can only be built with information sharing. If they did not share information between them, trust or mutual dependence could not be generated. It is logical that both mitigations come together in the analysis.

A fact that can influence positively in the establishment of long-term relationships is geographical closeness. These companies are all based in Italy sharing the same culture, social connections, and background – conditions for generating homophilic relationships between them.

Another mitigation strategy with a considerable occurrence is *Outsourcing*. The relationship between the customer and the company outsourced should be managed and controlled. Usually, methods used for this are included in the Outsourcing relationship management (ORM) model where elements of organizational structure, management strategy, and information technology infrastructure are included. The correct management

of this relationship will affect the firm and the supply chain considerably, even in the case where the outsourced company did not belong to the supply chain in the first place.

Some mitigations strategies such as *Information sharing* can be Enterprise to supply chain or Supply chain to supply chain cooperative depending on the risks they are mitigating. The mitigation strategy total occurrence (table 29), reveals that Supply chain to supply chain cooperative mitigations are relevant in the supply chains – *Long-term relationship* and *Information sharing* are in the top four of total appearance.

Supply chain to supply chain passive

Finally, Supply chain to supply chain passive mitigations strategies are depicted in the following table.

Table 30: ***Supply chain to supply chain passive mitigations' occurrence***

SCSC Passive	Occurrence
Pull contract	29,6%
Supplier selection	25,9%
Closed contract	20,4%
Long – term relationship	14,8%
Product innovation	3,7%
Supplier order allocation	3,7%
Differentiation	1,9%

Some mitigations that appear are unusual in this type of mitigations strategies. It is due to the risk *Substitutability*. If another one substitutes a firm in the supply chain, it is usually a choice of a player with enough power to decide the substitution – usually, the dominant player. Before substitution is carried out, the possible substitutable player could apply mitigations such as *Differentiation* or *Product innovation*. If the firm innovates or

differentiates in some way – appealing competitive advantages for the supply chain, the dominant player could reconsider the substitution that could be fatal for the non-dominant player.

The other strategies included in Supply Chain to supply chain passive mitigations are less rare than the abovementioned. The mitigated risks are mainly *Substitutability, Supplier selection/outsourcing*, and *Information outsourcing risks.* There are other risks in consideration but less relevant in occurrence.

The terms of trade between are chosen from three types of wholesale price contracts (Cachon, 2004):

1. **Push contract:** the supplier could charge a single wholesale price and not offer at-once orders: the retailer must pre-book inventory, and the supplier only produces the retailer's pre-booked quantity. All inventory risk is pushed onto the retailer.
2. **Pull contract:** single wholesale price but now the supplier charges that wholesale price for both pre-book and at-once orders. The retailer pulls inventory from the supplier with at-once orders, thereby leaving the supplier with all inventory risk.
3. **Advance-purchase discounts**: has two wholesale prices. The pre-book wholesale price is lower than the at-once wholesale price so that the retailer may pre-book some inventory (bearing the risk on that inventory), and the supplier may produce additional inventory in anticipation of at-once orders (and bears the risk on that additional production).

The particular contract adopted by the firms is the outcome of some bargaining process (Cachon, 2004) and depends on the power each company owns. The mitigation *Pull contract* is the highest Supply chain to Supply chain Passive mitigation strategy in

occurrence. This mitigation entails that some companies of the supply chain have less bargaining power than others that are pushing their inventory responsibility back into the supply chain, forcing companies to assume all the risk. This strategy only benefits one player in the supply chain and, usually, causes detriment to the others.

Supplier selection is a 100% Supply chain to supply chain passive mitigation strategy. One company chooses over another one to supply them. The choice must be studied in detail since it could affect company's strategy. Factors such as quality, reliability, price or service will be vital to making the final decision.

The other two mitigations with significant occurrence are *Closed contract* and *Long-term relationship.* As aforementioned, the establishment of a long-term relationship with suppliers is critical for the supply chain performance. In this case, it is Supply chain to supply chain passive strategy due to the risks it mitigates: *Substitutability* and *Supplier selection/outsourcing.*

Musa's Framework

Musa's framework would classify risks in the following table.

Table 31: ***Risks in Musa's framework occurrence***

Musa's Risk Framework	Occurrence
Material Flow – Supply chain Scope	28,9%
Material Flow - Make	25,7%
Financial Flow	24,4%
Information Flow	12,1%
Material Flow - Deliver	4,4%
Material Flow - Source	4,4%

More than 50% risks are affecting the Material flow and more in concrete the supply chain scope and the Make process. Material flow can be defined as the physical movement of products from suppliers to customers.

Supply Chain to supply chain mitigations' risks would be studied considering Musa's framework to focus on the strategies of interest.

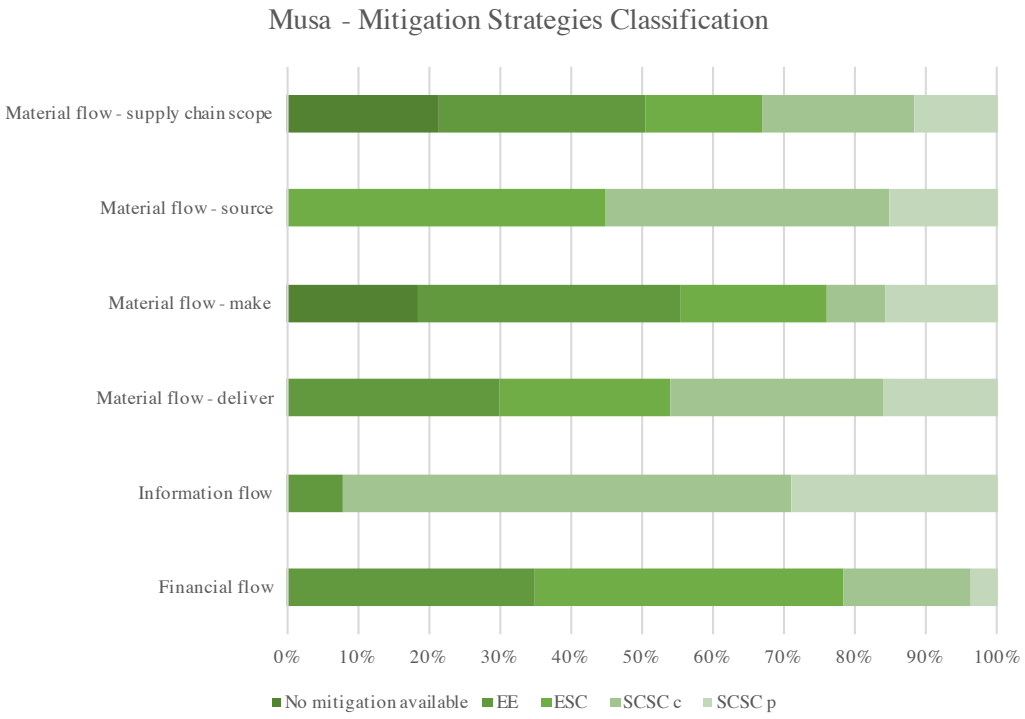

Figure 16: ***Musa's Framework vs. Mitigations classification***

The flow with the most significant percentage of Supply Chain to supply chain mitigations is *Information flow* with more than 90% while *Financial flow* only has 22% of Supply Chain to supply chain mitigations and *Material flow* 33% in total.

The results do not differ from what it is expected. Material flow risks are risks where movement of objects is implied. These risks are usually self-focused. Even though they

could affect other firms, they do not entail a relationship between firms, which leads to Enterprise to Enterprise or Enterprise to Supply chain mitigations strategies. The only mitigation strategy inside the Material flow risk– Supply chain scope considered by Musa that could regard two players of the supply chain is *Supply chain partners' relationships*. So, Supply chain to supply chain mitigations would appear in this flow in a significant proportion, but the results show that in these supply chain it is not the case.

Even though *Financial flow risks* affect all players in a supply chain, their mitigations strategies are mostly self-centered as it can be derived from the analysis. For example, if one player is struggling financially, its bankruptcy may carry consequences on every player in the supply chain – with different levels of severity on each one. The mitigations for these risks usually are selling assets, liquidating products or reducing unnecessary costs. All of them are based on the firm itself, not considering any other player of the supply chain.

Finally, the *Information flow risk* regards the communication between different players: demand, inventory forecasts or order fulfillment could not be carried out correctly without this flow. It is essential that *Information flow risks* are controlled – it implies value-creation, and it is the flow that connects material flow and financial flow. Because most of the mitigations are Supply chain to supply chain, it could be concluded that the flow in these supply chains is working correctly. Collaboration and cooperation for reducing and controlling the risks of the supply chain is the optimal solution for this problem. A firm working alone on risks entails a reduction in resources and capability. For example, a firm can work on their information accuracy risk and believe the risk is mitigated, while, if two firms collaborate on the strategy implementation, the information would be checked from two different points of view, improving the results considerably.

Dittman's Classification

The same analysis is done for Dittman's risk classification.

Table 32: ***Risks in Dittman's framework occurrence***

Dittman's Risk Framework	Occurrence
Level 1 – Operational Risks	37,8%
Level 2 – External Value Chain Risks	29,5%
Level 3 – Environmental Risks	22,9%
Level 4 – Functional Risks	9,8%

Only 9,8% of risks are out of what Dittman considers the principal risks of the supply chain. These risks come from enabling functions that support supply chain processes such as Finance or Human Resources and do not have potential effects across the entire supply chain.

In order regarding the correlation between Supply chain to supply chain mitigations strategies and Dittman's risks classification, a more in-depth analysis would be carried out.

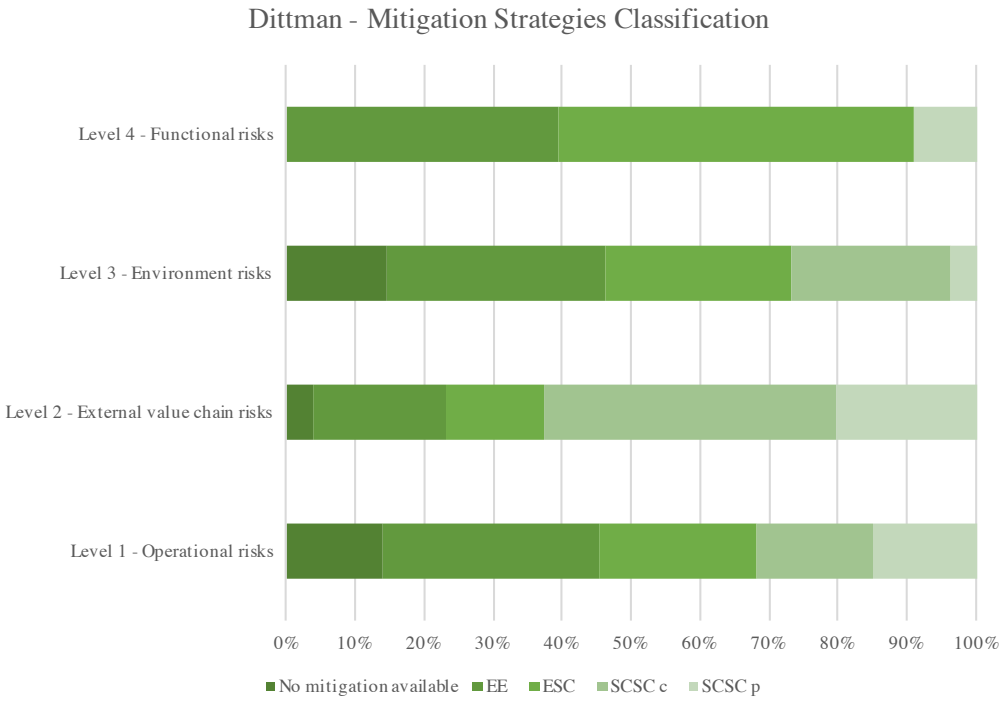

Figure 17: ***Dittman's Framework vs. Mitigations classification***

Level 2 – External value chain risks is where risks of interactions between different players of the supply chain are classified. For this reason, it is the level with the highest percentage of Supply chain to supply chain mitigations, both passive and collaborative. In the other levels, the occurrence of these mitigations is insignificant.

Musa - Dittman's framework

The combination of both frameworks is analyzed in the following table.

Table 33: ***Risks in Dittman - Musa's framework occurrence***

Dittman - Musa'S Risk Framework	**Occurrence**
Level 1 – Operational Risks	**37,8%**
Material Flow – Make	25,7%
Material Flow – Deliver	4,4%
Material Flow – Source	4,4%
Material Flow – Supply chain Scope	3,2%

Level 2 – External Value Chain Risks	**29,5%**
Material Flow – Supply chain Scope	16,2%
Information Flow	11,1%
Financial Flow	2,2%
Level 3 – Environmental Risks	**22,9%**
Financial Flow	13,3%
Material Flow – Supply chain Scope	9,5%
Level 4 – Functional Risks	**9,8%**
Financial Flow	8,9%
Information Flow	1,0%

The 9,8% risks out of the main supply chain risks, is inside the Financial Flow. Nearly 70% of the Operational Risks are from the Material Flow – Make process. So, only 23% of the risks are in the Delivery and Source processes. These risks could mean that the main operational risks are internal to each company or that the process of Make is profoundly affected by other members of the supply chain.

Table 34: ***Risks / Mitigations in Dittman - Musa's framework occurrence***

Dittman - Musa's Risk Framework	**No mitigations available**	**EE**	**ESC**	**SCSC cooperative**	**SCSC passive**
Level 1 – Operational Risks	**61,9%**	**50,4%**	**44,8%**	**34,4%**	**51,9%**
Material Flow – Make	0,0%	25,4&	27,9%	46,9%	28,6%
Material Flow – Deliver	76,9%	67,8%	51,2%	28,1%	60,7%
Material Flow – Source	0,0%	0,0%	20,9%	25,0%	10,7%
Material Flow – Supply chain Scope	23,1%	6,8%	0,0%	0,0%	0,0%
Level 2 – External Value Chain Risks	**9,5%**	**16,2%**	**14,6%**	**45,2%**	**37,0%**
Material Flow – Supply chain Scope	0,0%	26,3%	0,0%	9,5%	0,0%

Information Flow	0,0%	0,0%	0,0%	57,1%	55,0%
Financial Flow	100,0%	73,7%	100,0%	33,3%	45,0%
Level 3 – Environmental Risks	**28,6%**	**22,2%**	**22,9%**	**20,4%**	**5,6%**
Financial Flow	0,0%	53,9%	86,4%	57,9%	0,0%
Material Flow – Supply chain Scope	100,0%	46,2%	13,6%	42,1%	100,0%
Level 4 – Functional Risks	**0,0%**	**11,1%**	**17,7%**	**0,0%**	**5,6%**
Financial Flow	0,0%	76,9%	100,0%	0,0%	100,0%
Information Flow	0,0%	23,1%	0,0%	0,0%	0,0%

Regarding the Operational risks: Material flow – Make, it is profoundly affected by other members of the supply chain due to the primary mitigations that appear in that flow: Supply chain to supply chain cooperative. This mitigation strategy could mean that mitigating an operational risk in collaboration with another player of the supply chain brings to the supply chain a better solution than other self-oriented mitigations strategies. If the operations of a company are optimized, supply chain performance is improved. Factors such as technological improvement in the process of a supplier could lead to a supply chain higher flexibility. Betts and Tadisina (2009) identified some benefits of collaboration: revenue enhancements, cost reductions, operational flexibility to cope with demand uncertainties (Fisher, 1997; Lee, Padmanabhan, & Whang, 1997; Simatupang et al., 2005); increased sales, improved forecasts, more accurate and timely information, reduced costs, reduced inventory, improved customer service, (Barratt & Oliveira, 2001; Whipple et al., 2007); division of labor, exchanges of knowledge about products and processes (Kotabe, Martin, & Domoto, 2003) and cost and/or problem avoidance (Whipple, 2007). Nearly all of the pros of collaboration are related to operations explaining the conclusion mentioned above.

The Supply chain to supply chain passive mitigations are mainly in the Material Flow – Deliver, also Operational risks. Demand uncertainties are one of the leading problems in the supply chain – inventory management is highly linked to it. For their prediction, information sharing is necessary. In the case where no collaboration between companies is carried out, some companies may force others to implement mitigations that only or mostly benefit one player – the dominant player. For example, a pull contract or other inventory management strategies between both of them could be established, affecting considerably demand and with it, the Material Flow – Deliver.

Risk Assessment Matrix

As explained before, the analysis is considering risk probability, risk impact, and risk relevance. The Risk Assessment Matrix with axe x *Risk Impact* and axe y *Risk Probability* will be built to measure risk exposure and provide information about the most relevant risks –priority risks. Both impact and probability will be measured from 1 to 5. So, the impact that is currently up to 10 will be divided by 2 and probability that is currently up to 5 will continue this way. The calculus is:

1. Divide by two the *Impact*
2. Multiplication between *Probability* and *Impact*
3. Mean of the previous result and mean of the *Impact* and *Probability* between all the firms - by supply chain

Table 35: ***Risk Assessment Matrix for all risks considered***

	The severity of the Potential Damage				
	Insignificant damage	**Slight damage 2**	**Limited damage**	**Major damage 4**	**Catastrophic damage**

		1		**3**		**5**
Likelihood	**Extremely unlikely 1**	**1** *New machinery search* *Financial exposition* *Intellectual property* *Industrial accident*	**2** *Industrial district absence* *Shipment risks* *Nonpayment* *Production innovation absence* *Fashion collection design* *Key person absence*	**3** *Shipment costs*	**4** *Price and cost*	**5**
	Remote possibility 2	**2** *Theft* *Environmental disruptions* *Technical person absence* *Spare parts for old machinery* *Supplier delays*	**4** *Seasonal demand* *Arrest machines* *Human Resources renewal* *Raw material costs* *Culture and ethics* *Ecological regulations* *Sourcing flexibility* *Importation taxes* *International regulations* *Shipment delays* *International shipment delays* *Changing brand* *Machines innovation* *Key customer absence* *Raw materials procurement*	**6** *Supply product monitoring/ quality* *Supply chain interruption*	**8** *Information outsourcing* *Mistakes on larger orders* *Information accuracy* *Planned orders reduction* *Substitutability* *Information system security and disruption*	**10**

			Bottleneck machine			
	Possible occur 3	**3** *Human Resources dynamics* *Exchange rate risk* *Old infrastructure*	**6** *Economic crisis* *No information sharing*	**9** *Supply chain partners' relationships*	**12**	**15**
	Probably occur 4	**4**	**8** *The financial strength of supply chain partners*	**12** *Government instability* *Supplier selection/ outsourcing*	**16** *Operational disruption*	**20** *Financial handling/ practice*
	Almost certain 5	**5**	**10** *Process and design*	**15** *Product process and design*	**20**	**25**

The risks of most exposure are *Financial handling/practice* and *Operational disruption.* These risks entail enormous consequences for the supply chains and should be mitigated. In the introductory chapter, an explanation about the trade-off between mitigations and costs was made.

In the following figures, the most relevant risks are cross with their mitigations strategies to establish a balance between priority and costs. The graph shows the mitigation strategy plus its risk separated by a hyphen. The axe y is their mitigation strategy type, and

axe x is the occurrence of that mitigation – mitigation plus risk with that exposure in the supply chains.

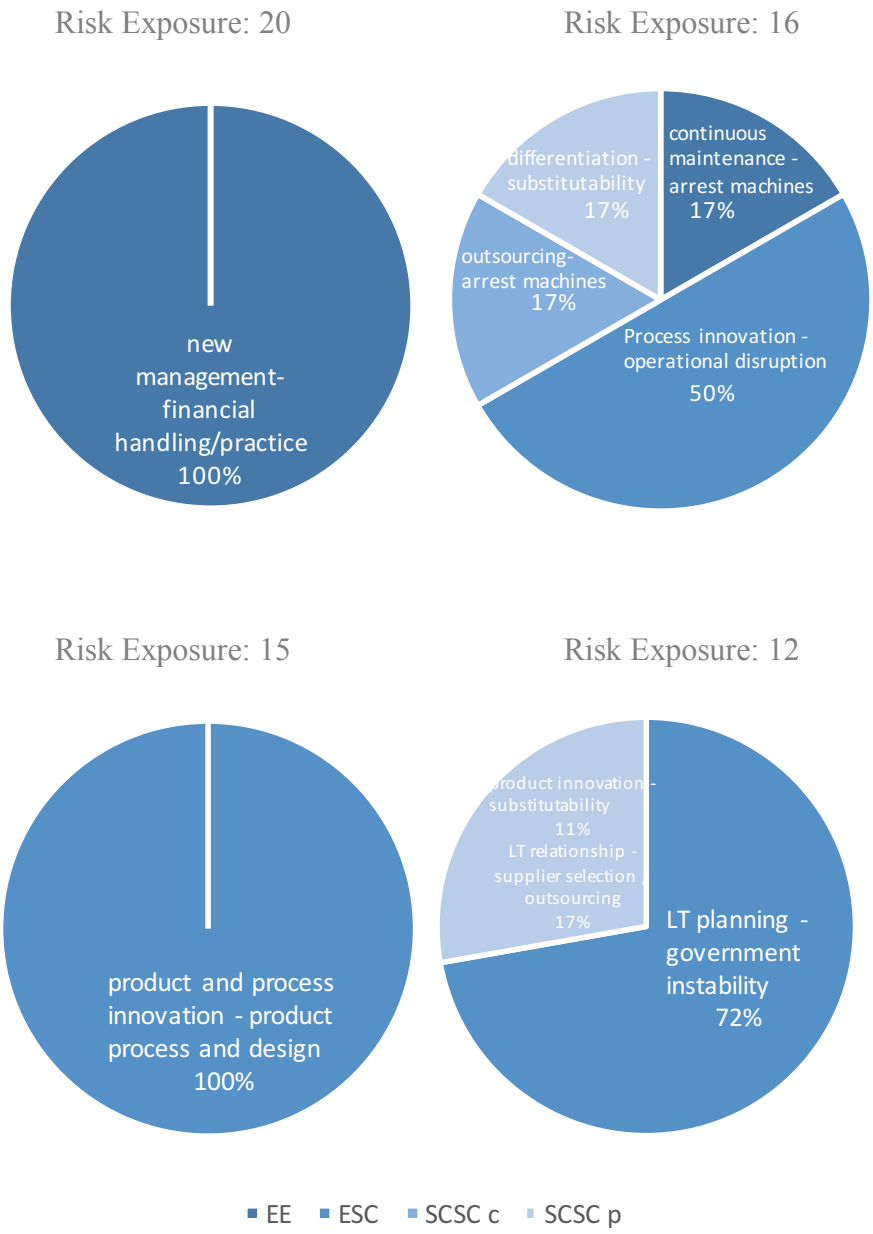

Figure 18: ***Risk exposure: Mitigations - Risks***

Most of the mitigations strategies are Enterprise to enterprise or Enterprise to supply chain. There three mitigations Supply chain to supply chain: *Outsourcing, Differentiation, Product innovation*, and *Long-term relationship*. They are expensive and difficult to

implement, but due to the severity of the risks, they must be introduced in the supply chain. The other mitigations (Enterprise to enterprise or Enterprise to supply chain) are also needed but require less effort concerning coordination or relationship from firms to be correctly implemented.

Going back to the Risk Assessment Matrix, there are some risks such as *New machinery search* that probably should not be mitigated – their exposure is very weak, and their mitigation cost would be higher than the benefit the company/supply chain will obtain for mitigating those risks.

The Risk Assessment Matrix allows focusing on several risks that entail enormous consequences for the supply chain or company and leave aside the risks with less impact and probability of occurrence.

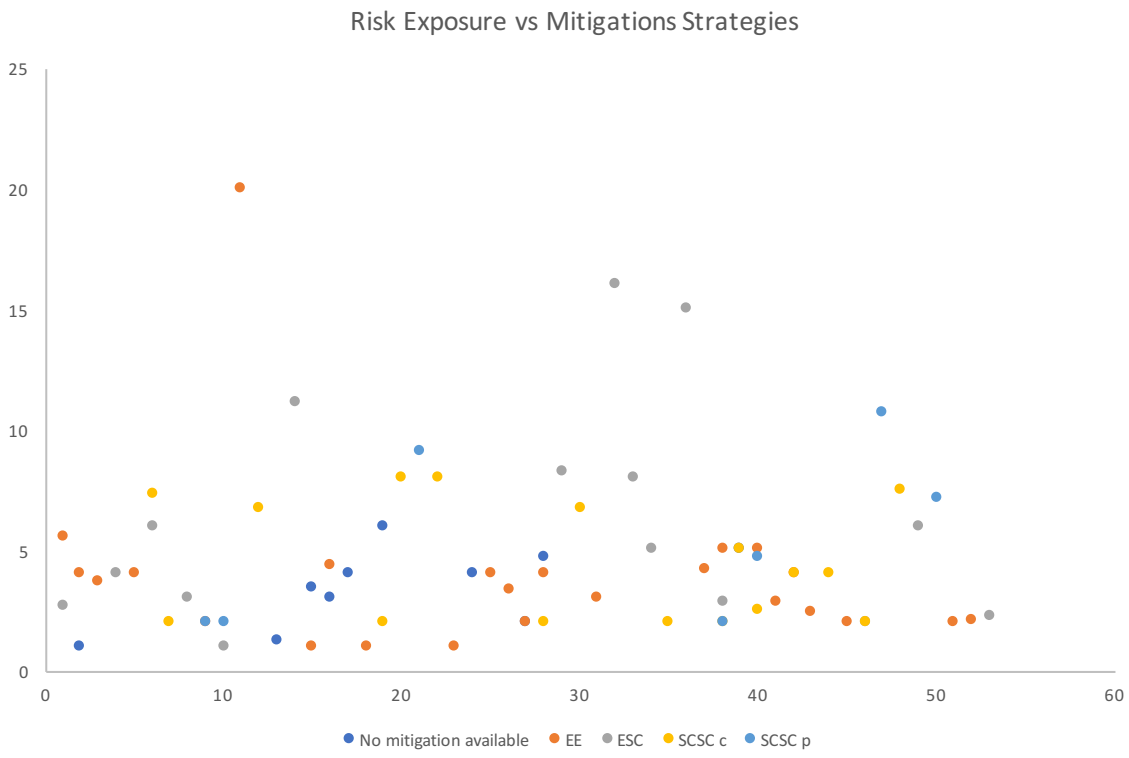

Figure 19: ***Risk exposure vs. Mitigations Strategies***

The occurrence is axe x, and the exposure is axe y. The most relevant risks are Enterprise to supply chain or Enterprise to enterprise in this supply chains – high exposure and high occurrence. When exposure is around 8, there are a considerable number of Supply chain to supply chain cooperative mitigations strategies and one Supply chain to supply chain passive that is relevant – more than 10 in exposure and present more than 45 times in the supply chains.

This analysis can be widened by considering Dittman-Musa's frameworks.

Dittman – Musa's Risk Assessment

Regarding the previous table of risk occurrence (table 36), new columns will be added to link it with probability and impact, which means that is the measure of the total exposure to that type risk.

Table 36: ***Risks in Dittman - Musa's framework occurrence and exposure***

Dittman - Musa's Framework	Occurrence	Impact	Probability	Exposure
Level 1 – Operational Risks	**37,8%**	**2**	**2**	**4**
Material Flow – Make	25,7%	3	2	6
Material Flow – Deliver	4,4%	2	2	4
Material Flow – Source	4,4%	2	2	4
Material Flow – Supply Chain Scope	3,2%	2	1	2
Level 2 – External Value Chain Risks	**29,5%**	**2**	**3**	**6**
Material Flow – Supply Chain Scope	16,2%	2	2	4
Information Flow	11,1%	4	2	8
Financial Flow	2,2%	1	2	2
Level 3 – Environmental Risks	**22,9%**	**2**	**3**	**6**
Financial Flow	13,3%	1	2	2
Material Flow – Supply Chain Scope	9,5%	3	1	3

Level 4 – Functional Risks	**9,8%**	**2**	**2**	**4**
Financial Flow	8,9%	1	1	1
Information Flow	1,0%	1	1	1

Since the occurrence of *Level 1: Material Flow – Make* and *Level 2: Information Flow* is high and, at the same time, their exposure is 6 or 8, they are the primary risks to analyze. Regarding the conclusions of before, the operational risks are more severe when it comes to *Make*. The flows mostly affected are as expected: Material Flow (operational disruptions). A study considering the different type of mitigations strategies will be carried out to regard in-depth conclusions about flows.

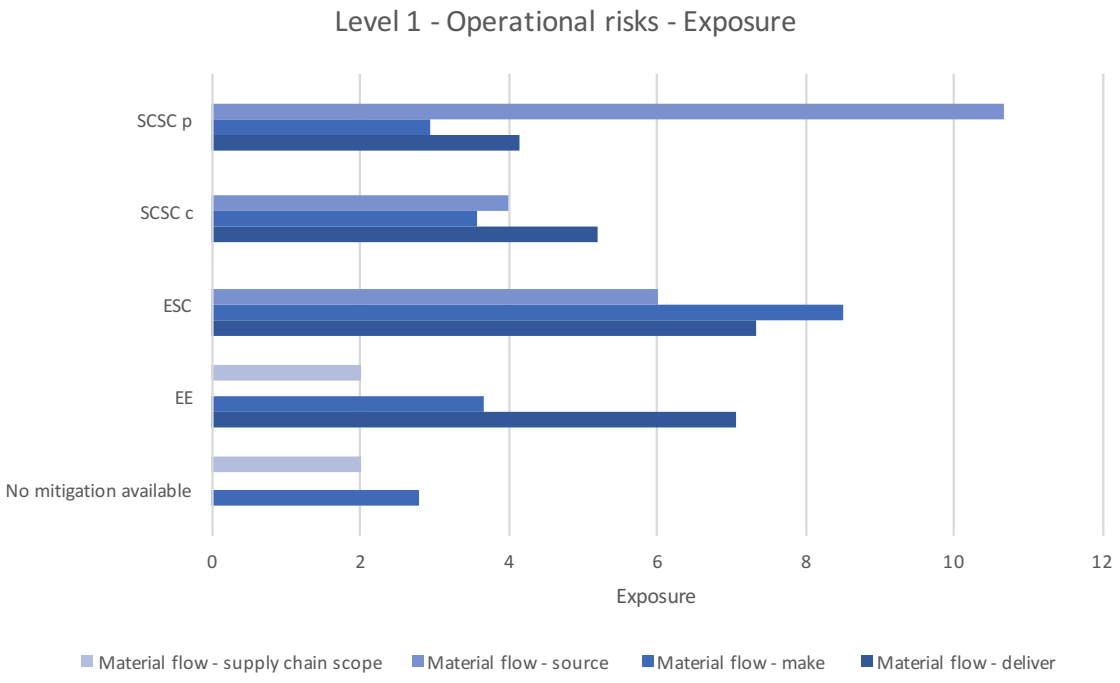

Figure 20: ***Risk exposure vs. Musa – Dittman – Level 1: Operational risks***

The most relevant risk is *Supplier selection/outsourcing* inside Material flow - Source and is Supply chain to supply chain passive.

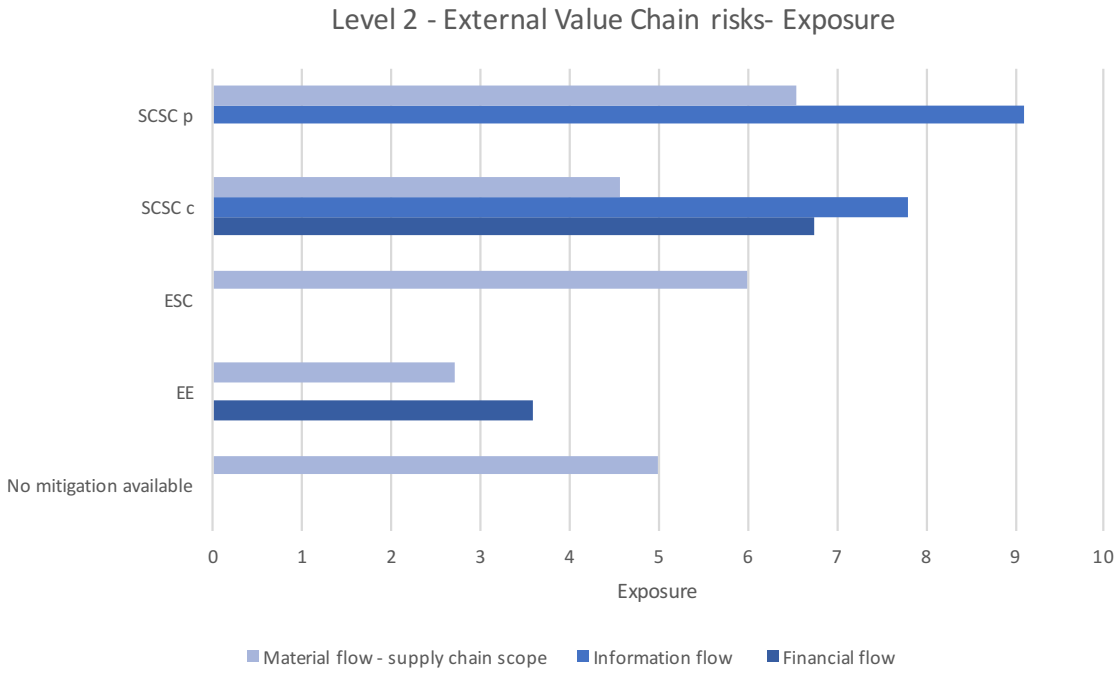

Figure 21: ***Risk exposure vs. Musa – Dittman – Level 2: External Value Chain risks***

In Level 2, outstanding risks are inside Information flow: *No information sharing, Information system security and disruption* and *Information outsourcing* and they are Supply chain to supply chain mitigation strategies.

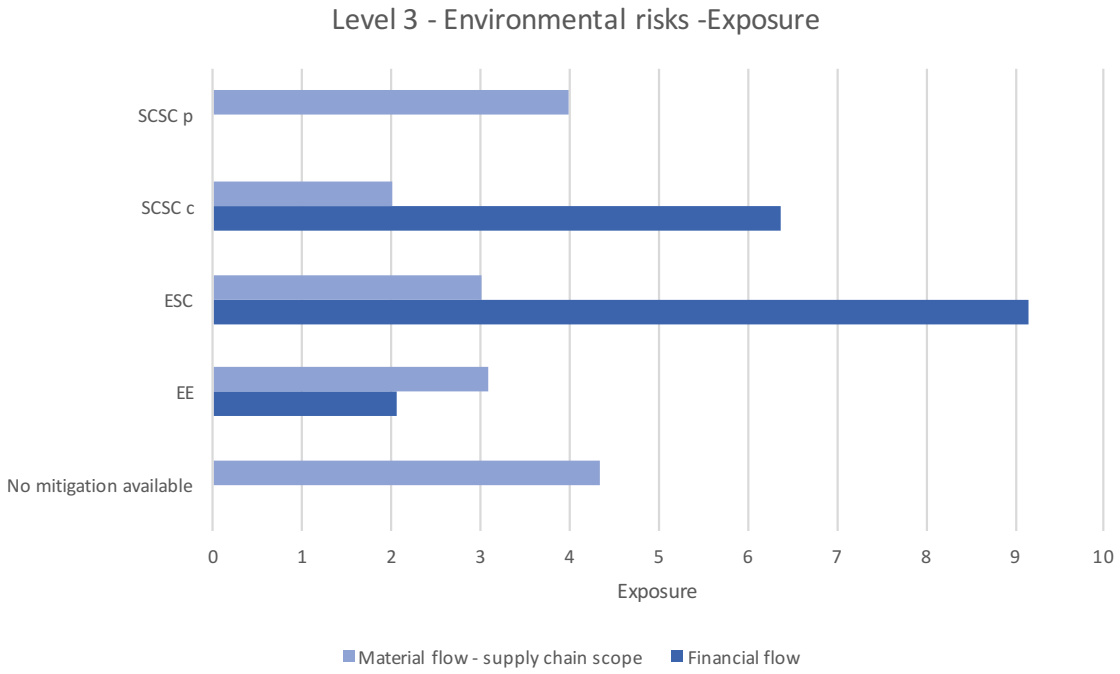

Figure 22: ***Risk exposure vs. Musa – Dittman – Level 3: Environmental risks***

There are relevant risks with Enterprise to supply chain mitigations in the Financial flow: *Government instability, Exchange risk rate* and *Economic crisis.* Due to the current political situation of instability in Italy, the *government instability risk* has become one of the priorities in companies of different sectors. It can entail a deceleration in the Italian economy, due to the lack of policy measures, to keep track with the rest of Europe. More importantly in this industry, where the trend is downsloping in comparison to other European countries.

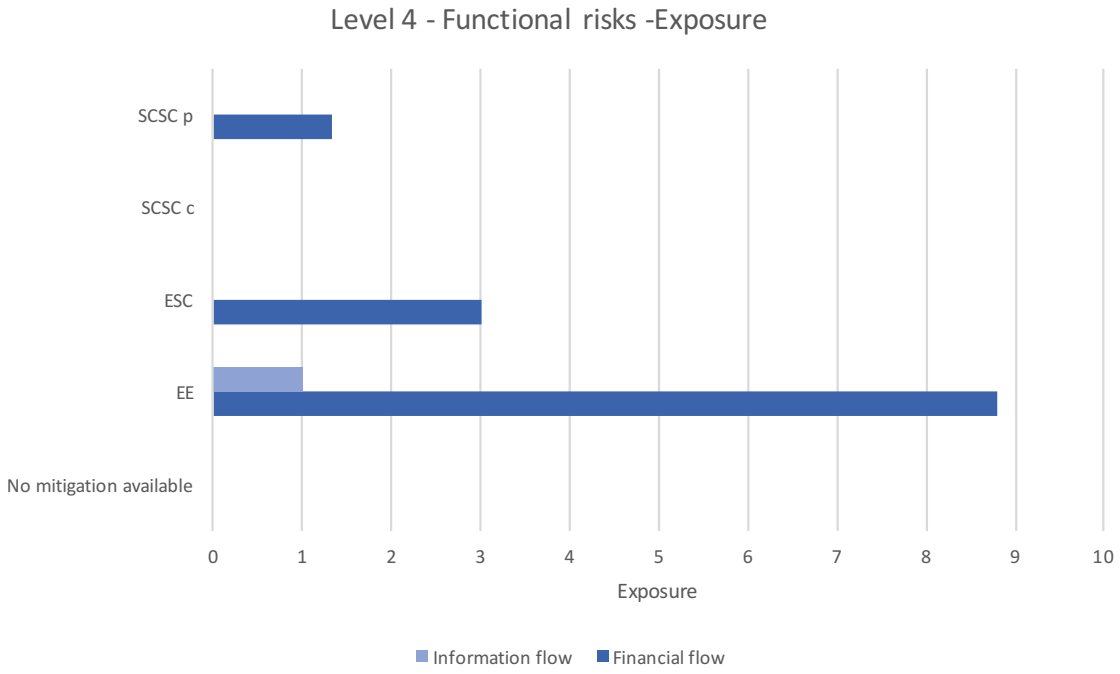

Figure 23: ***Risk exposure vs. Musa – Dittman – Level 4: Functional risks***

The risk that makes Enterprise to enterprise mitigations so high on average is *Financial handling/practice*, as studied before it is 20 on exposure and appears three times on the supply chains.

Porter's framework

The following table represents the risk occurrence linked with Porter's value chain functions.

Table 37: ***Risks' occurrence in Porter's framework***

Porter's Functions	Occurrence
Primary Activity - Operations	40,3%
Primary Activity – Marketing and Sales	24,4%
Support Activity – Procurement	9,8%
Primary Activity - Service	7,6%
Primary Activity – Inbound Logistics	6,7%

Primary Activity – Outbound Logistics	4,1%
Support Activity – Human Resources	3,2%
Support Activity – Firm Infrastructure	2,2%
Support Activity - Technology	1,6%

As in Dittman-Musa's framework, operations are the most affected by risks. "Fast fashion" plays a determinant role in this conclusion. Operations must be flexible and able to fulfill orders in a short period. If risks are affecting them, the company is weakened, which can be detrimental to other business units such as finance or service.

The relationship between exposure and Porter's functions is studied to see where risks' exposure is more critical in these supply chains. A mean of risks' exposure in each function is calculated.

Table 38: ***Risks exposure in Porter's framework***

Porter's Functions	**Exposure**
Primary Activity - Operations	4
Primary Activity – Marketing and Sales	8
Support Activity – Procurement	3
Primary Activity - Service	8
Primary Activity – Inbound Logistics	6
Primary Activity – Outbound Logistics	3
Support Activity – Human Resources	3
Support Activity – Firm Infrastructure	3
Support Activity - Technology	3

Marketing and Sales and Inbound Logistics are the critical areas in this case. In order not to use the average, a dispersion graph will be carried out. Every point represents a different risk, axe y is risk exposure, and axe x is the occurrence.

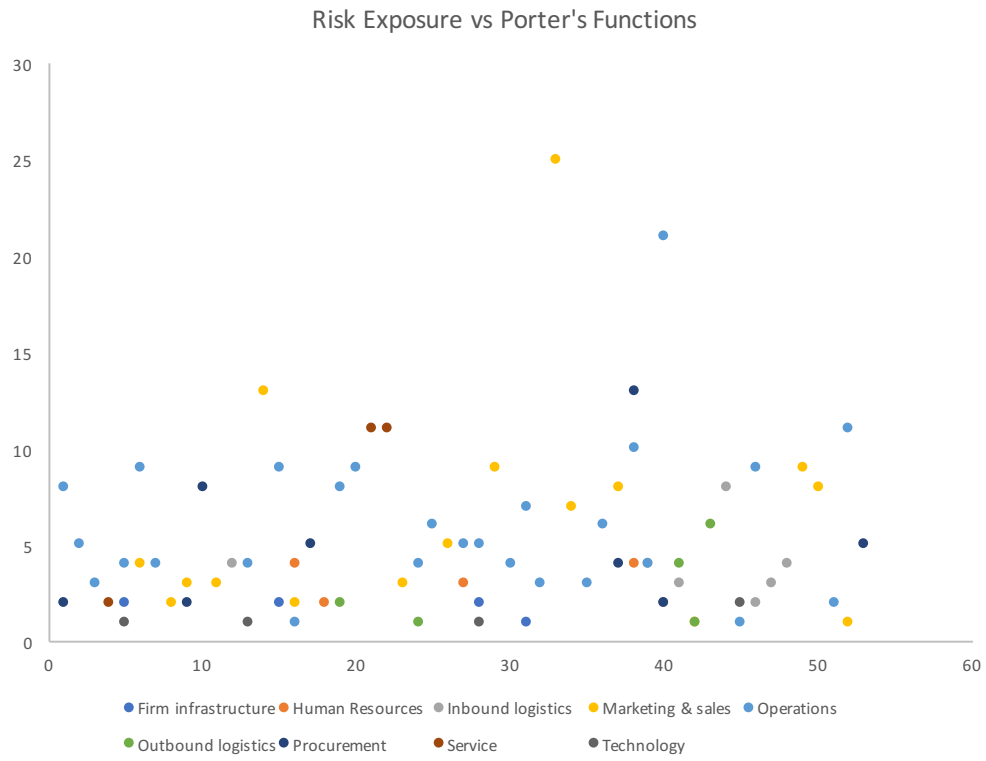

Figure 24: ***Risk exposure vs. Porter's Functions***

The risks with the highest exposure belong to Marketing and Sales and Operations, and their occurrence is also high – around 30-40 times. Collaborative mitigations for risks with such a high occurrence should be considered. If companies of the same supply chain work together against specific risks, the effectiveness of mitigations strategies would be higher than alone. Several studies prove that cooperation between firms in the supply chain boost performance and mitigates supply chain risk such as Chen's (2012) study of 230 Australian companies. This philosophy is based on a system view of a supply chain rather than a set of fragmented parts (Mentzer et al., 2001).

Further analysis must be carried out to regard the correlation between Porter's functions and Supply chain to supply chain mitigations strategies.

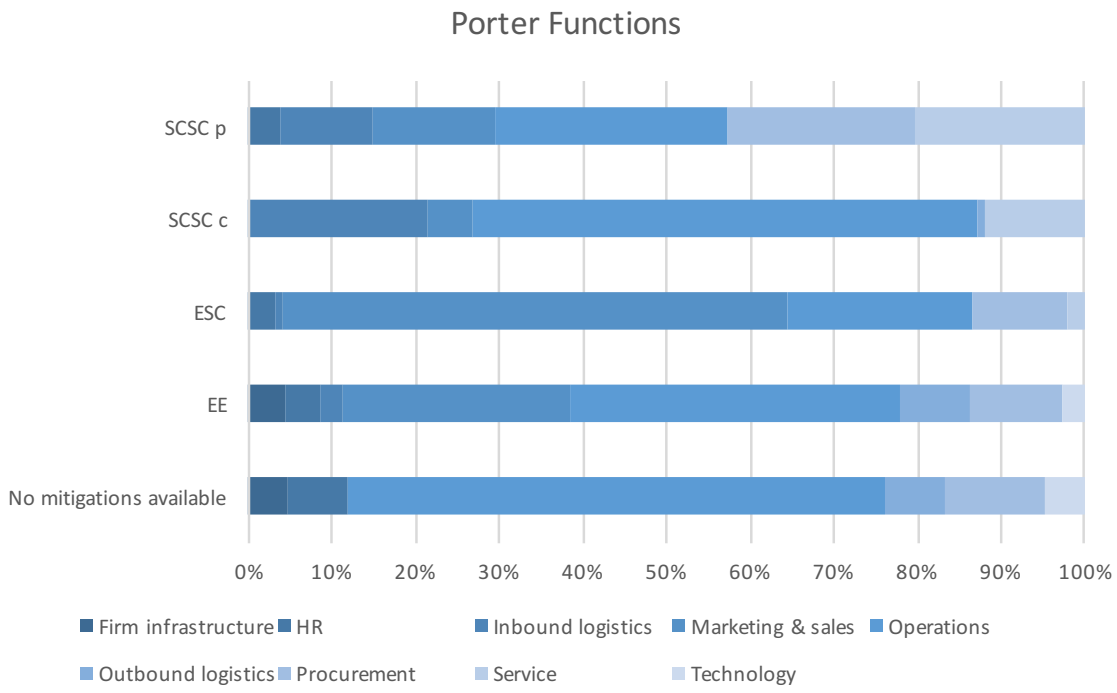

Figure 25: ***Porter's Functions vs. Mitigations strategies***

Supply chain to supply chain mitigations strategies are more numerous in Operation activity. Supply chain to supply chain passive are also relevant to Procurement and Service. The logical functions linked to Supply chain to supply chain mitigations strategies should be Inbound and Outbound logistics, Service and Procurement. Since Operations has the highest numbers of occurrence, is reasonable that a higher percentage of it than in other cases appears in Supply chain to supply chain mitigations.

For Porter (1998), in a value chain, efficiency depends on every activity, process, and function throughout the chain being performed efficiently. The presence of risks, however, can influence the cost-benefit valuation of an enterprise about its possible

participation in a value chain. So, every function must have their principal risks mitigated to work together correctly and fulfill company's objectives of creating value.

Porter's Value Chain Model is used to create a link between value creation and Supply chain risk management. This model allows examining where the value (competitive advantage) is being created – costs and profits. Risks and mitigations entail costs and cost savings – depending on the balance between the necessity to mitigate risk and its cost.

Regarding the mitigations on consideration, Supply chain to supply chain mitigations are usually less expensive than Enterprise to Enterprise mitigations – since another firm is involved too – but, at the same time, there are more challenging to implement – collaboration or power is needed. So, if they build stronger relationships or power and they are cost saving mitigations, the assumption that these mitigations are creating more value can be made.

Studying more deeply these mitigations in each function (dividing them by Primary functions and Support activities), the following graphs are depicted.

Primary functions:

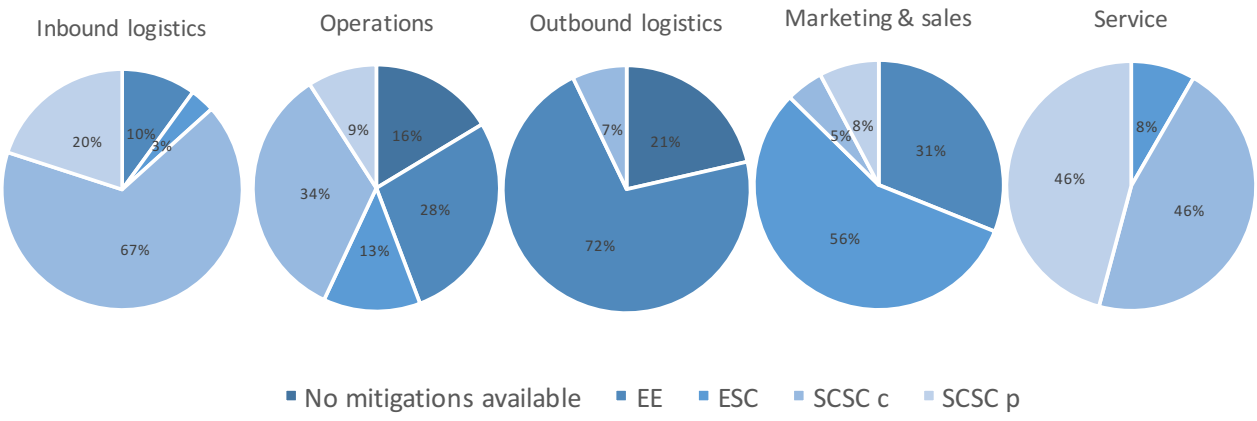

Figure 26: ***Firms' functions vs. Mitigations classification – Primary functions***

Support activities:

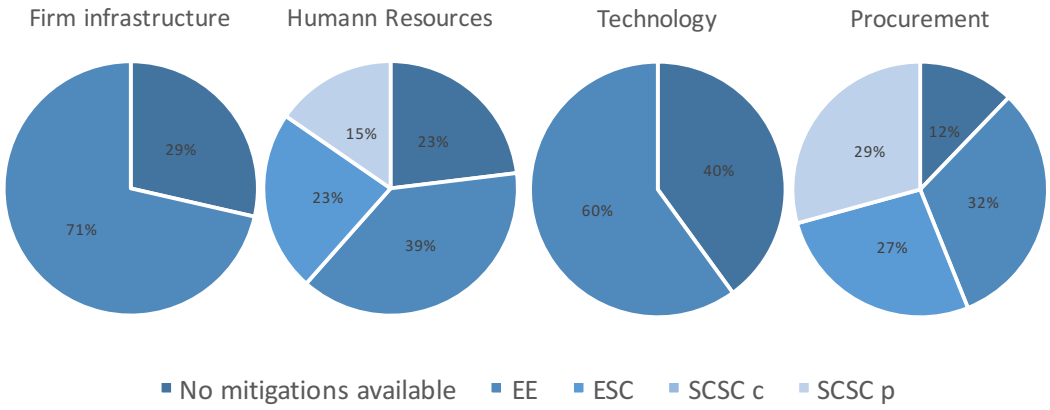

Figure 27: ***Firms' functions vs. Mitigations classification – Support activities***

As expected, some functions do not have passive mitigations strategies: Technology, Firm infrastructure or Outbound logistics. For example, if the company changes the infrastructure by mitigating some risk, the mitigation would not imply directly another company. The other company could be affected by the mitigation (Enterprise to supply chain mitigation), but the strategy is mainly self-focused.

The primary function with the most prominent percentage of the mitigations of interest is Service followed by Inbound logistics – in both cases close to 90%. A curious fact is that Supply chain to supply chain collaborative mitigations are not considered when it comes to supporting activities.

A comparison between functions and mitigations classification can be found below. The number of mitigations is stated as a percentage of the total appearance of mitigations in that particular function.

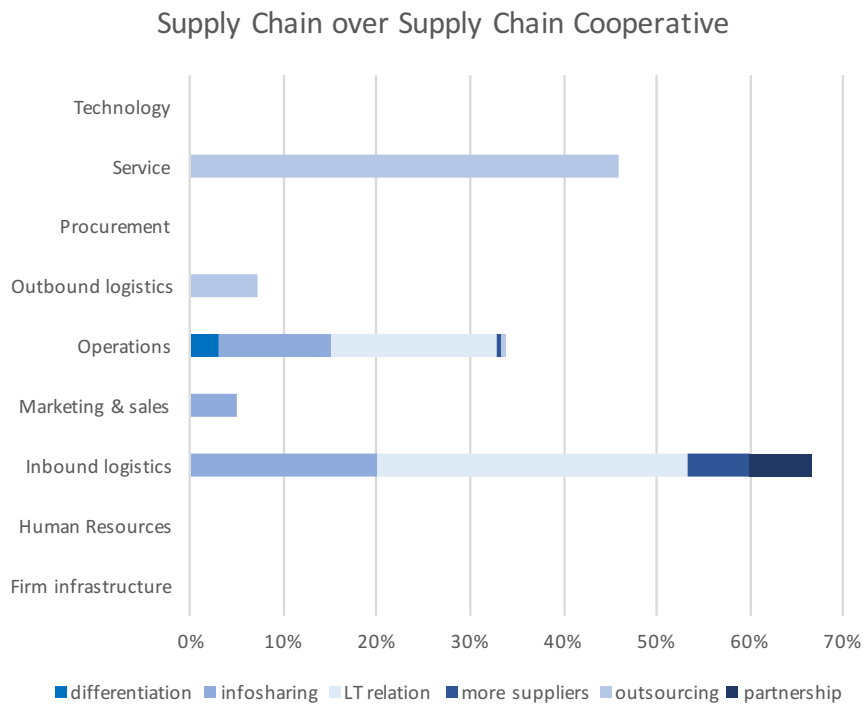

Figure 28: ***Firms' functions vs. Mitigations– Supply Chain to Supply Chain Cooperative***

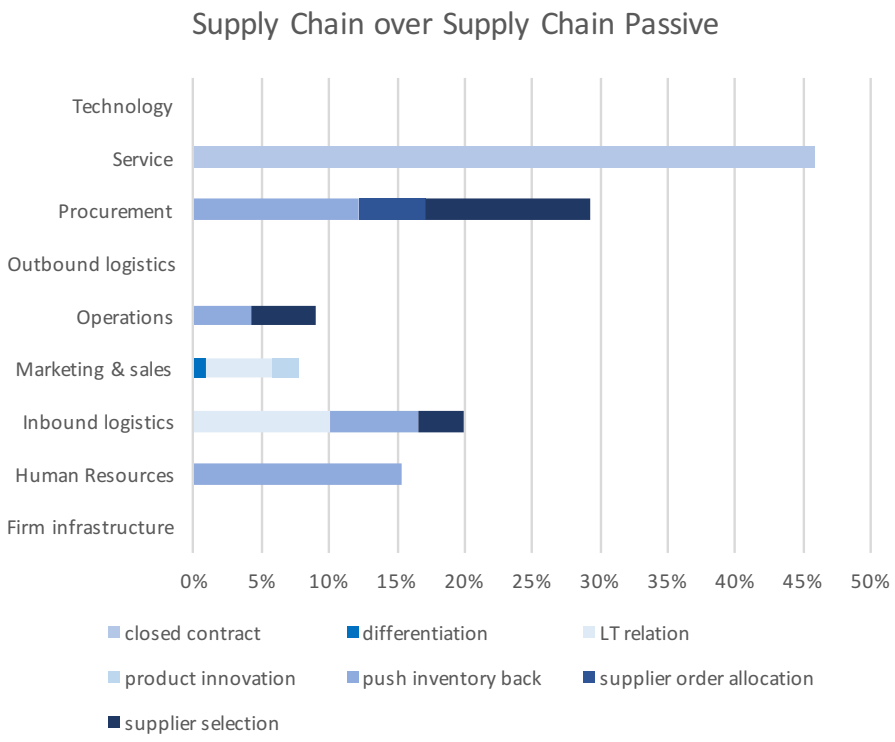

Figure 29: ***Firms' functions vs. Mitigations – Supply Chain to Supply Chain Passive***

More information can be unlocked adding the mitigation + risk since some mitigations strategies are equal in the figures above. Regarding the risks they mitigate, a better analysis can be carried out. The following figures will have precisely the same layout as the previous ones to make them more visual.

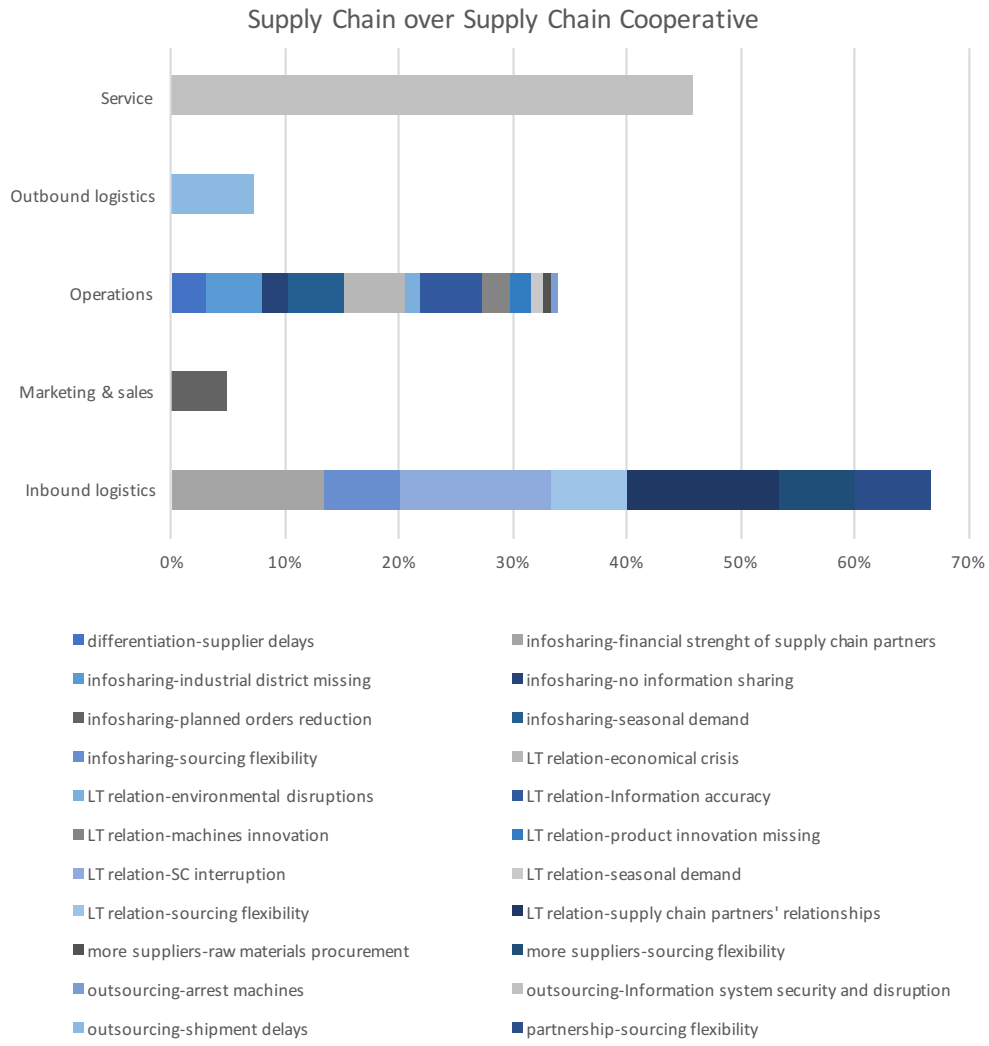

Figure 30: ***Firms' functions vs. Mitigations + Risks – Supply Chain to Supply Chain Cooperative***

The most diversify when it comes to risks, and Supply chain to supply chain cooperative mitigations are Operations and Inbound Logistics. As studied before,

Operations are the most numerous risks, so it is logical to have also a high number of mitigations strategies.

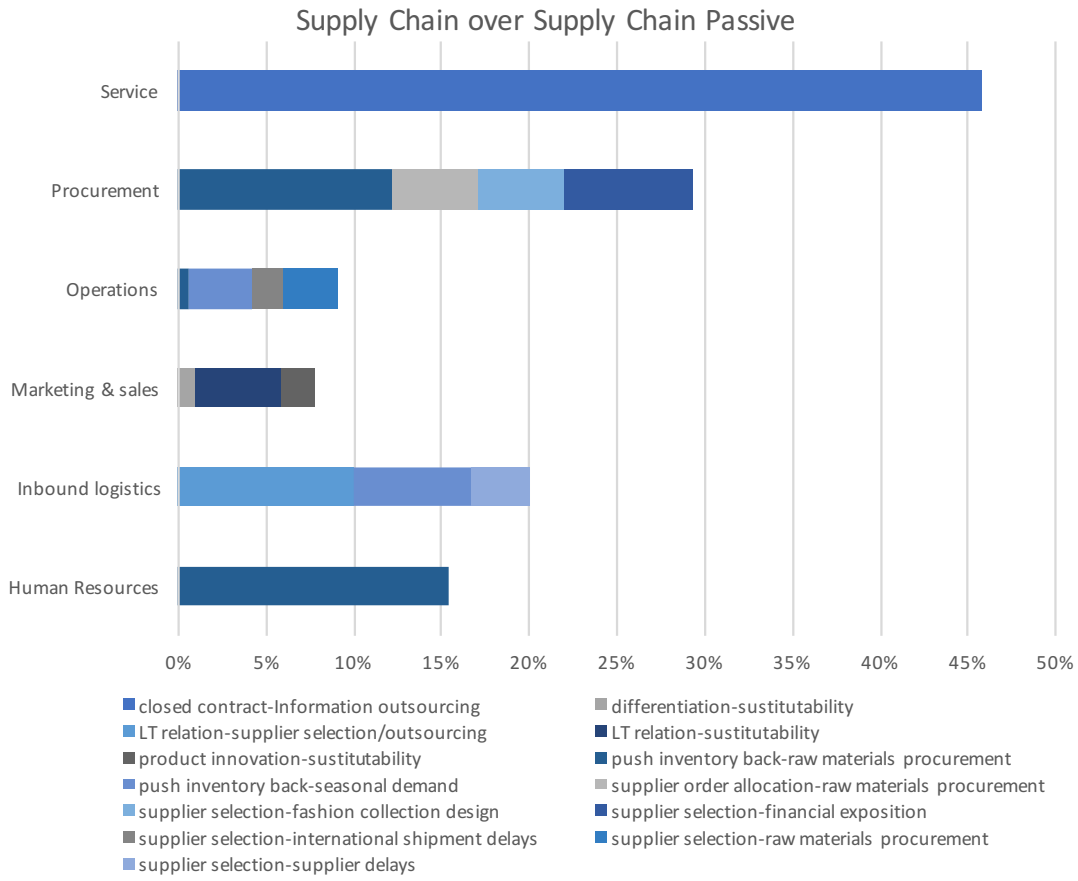

Figure 31: ***Firms' functions vs. Mitigations + Risks – Supply Chain to Supply Chain Passive***

In this case, diversification between risks and mitigations is not so relevant as in Supply chain to supply chain cooperative. It is true that in this type of mitigation there are fewer risks, so fewer mitigations were expected.

Risk classification in Supply Networks

Harland, Brenchley and Walker classification could bring a new point of view to the problem studied. The classification of risks is different from the previous ones, due to the nature of the risk and regarding what function or goal it affects.

The risks' occurrence and exposure are shown in the following table.

Table 39: ***Risks exposure in Risk classification in Supply Networks***

Risk classification in Supply Networks	Occurrence	Exposure
Financial risk	23,6%	8
Strategic risk	21,4%	6
Operations risk	18,7%	5
Supply risk	16,7%	4
Regulatory risk	6,0%	3
Reputation risk	5,7%	6
Competitive risk	4,2%	3
Customer risk	1,7%	3
Asset impairment risk	1,5%	2
Legal risk	0,5%	1

There is no fiscal risk. Since currently there is no government in Italy, fiscal policies are not expected to be introduced in the short term reducing this risk. Even though Italy had a stable government, fiscal policies could affect companies but in a small proportion. This type of risks is more likely in less developed countries, usually not belonging to European Union.

The first curious conclusion is that, in this case, occurrence and exposure seem to be correlated – exception Reputational risk. It is also surprising that the exposure is high in several categories, making it difficult with only this information to choose what risks have priority when mitigating risks. A dispersion graph will be carried out to regard the exposure without an average.

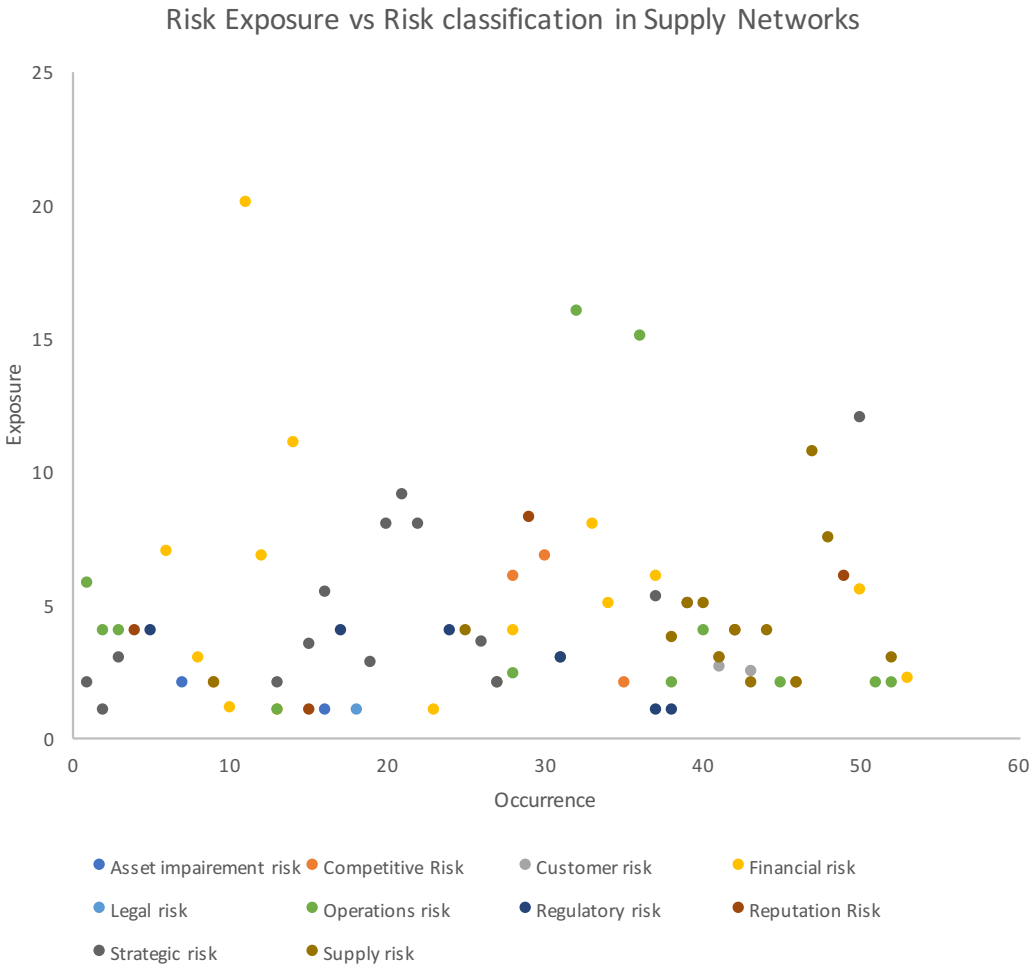

Figure 32: ***Risk exposure vs. Risk classification in Supply Networks***

The most relevant risk in exposure is the financial risk as the table shown. There are other considerable risks: two operational (*operational disruption:16 and product and process design risk:15*) and one strategic (*substitutability risk:12*).

In high occurrence, there is a cluster of reputation risk with exposure between 10 and 2. Reputation risk entails the loss of confidence from other parties in the business carrying financial and competitive advantage risks.

The dispersion graph allows regarding that the outliers are little and the tendency is to have exposure around 5.

A correlation between risk classification and mitigations classification will be carried out to focus on the mitigations of study.

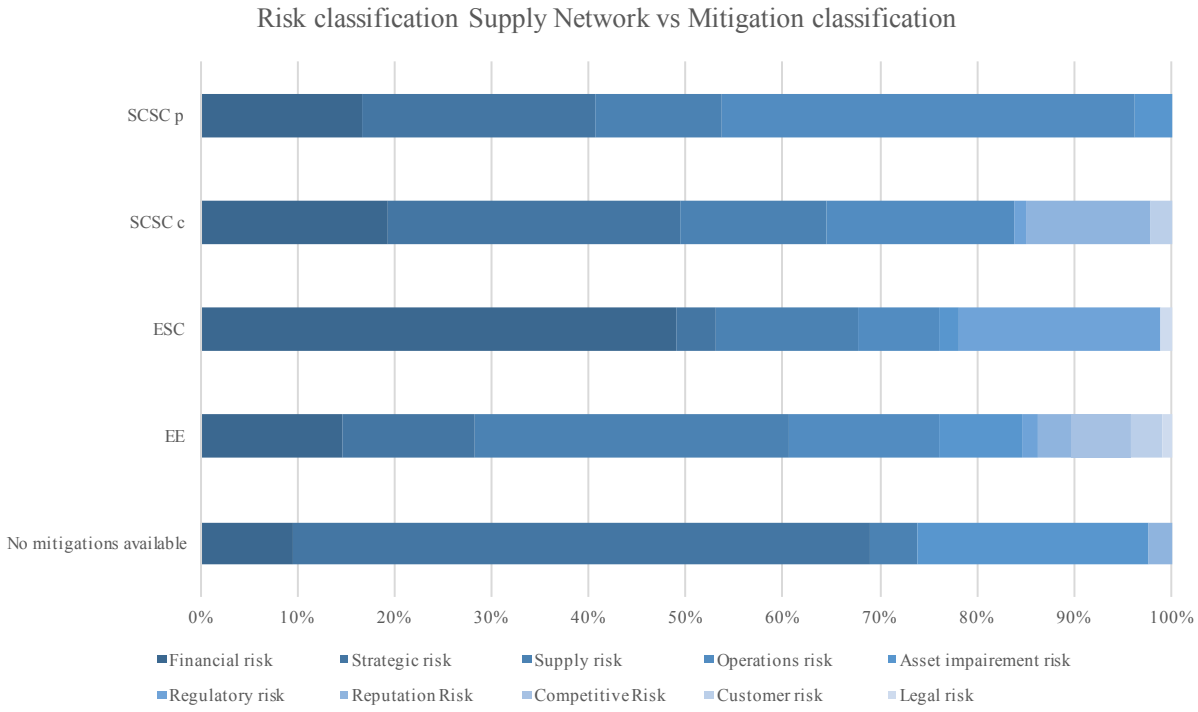

Figure 33: ***Risk classification vs. Mitigations strategies***

Supply Chain to supply chain passive mitigations are mainly Supply (mitigations strategies: *supplier selection, supplier order allocation, pull contract* and *long-term relationship*), Strategic (mitigations strategies: *closed contract* and *product innovation)* and Financial risks (mitigations strategies: *long-term relationship, supplier selection,* and *differentiation*). On the other hand, Supply chain to supply chain cooperative are more diverse: Financial (mitigations strategies: *information sharing* and *long-term relationship*), Supply (mitigations strategies: *long-term relationship, information sharing, more suppliers* and *partnership*), Strategic (mitigations strategies: *information sharing, outsourcing* and *long-term relationship*), Operations (mitigations strategies: *long-term relationship, information sharing, outsourcing* and *more suppliers*) and Competitive risks (mitigations

strategies: *long-term relationship, information sharing* and *differentiation*). So, the risks classifications more affected by Supply chain to supply chain mitigations strategies are Strategic and Supply risks. Supply risks is an expected result since Supply chain to supply chain mitigations include every strategy related to relationships between different players while Strategic risks classification implies that supply chains' strategies are closely correlated with Supply chain to supply chain mitigations strategies.

Supply chain and firm's goals will be studied in detail to find the correlation this analysis has suggested.

Goals

Regarding the goals of the supply chain, the first goal of all supply chains is *the Price leader*, and the mean for achieving this goal is *Defending their status in the industry.*

The second objectives of the supply chains are *Contraction/Expansion* for Intimissimi - Silk wool and *Global Supply Chain* for Intimissimi – Underwear and Calzedonia – Socks. All the supply chains will achieve their goal by *Growing fast*.

The third goal is *Global Supply Chain* for Intimissimi – Silk wool and *Introducing a new product* for the other two supply chains. The mean for achieving their objectives, in this case, is *Grow with industry* in all the cases.

The primary means to achieve the goals is growth. Several studies claim that Supply chain risk management boosts performance such as Lavastre, Gunasekaran, & Spalanzani (2011). Other studies imply that collaboration between companies also affects positively in supply chain performance such as Chen (2012). If supply chain performance is improved, then supply chain will experiment growth and, therefore, companies will be more dedicated to the supply chain or grow themselves. Considering that Supply chain to

supply chain mitigation strategies are vital to this goal, an in-depth analysis will be carried out.

Regarding firm's goals, table 40 states all their goals and the means to achieve them. Calzedonia and Intimissimi goals are not considered in the study.

Table 40: ***Firm's goals and means to achieve the goals***

Firm	Goal 1	Mean	Goal 2	Mean	Goal 3	Mean
Franzoni	Price leader	Defend status	Market dominance	Grow fast	-	-
Friultex	Price leader	Defend status	Market dominance	Grow fast	New Product	Grow with industry
Italfil	Price leader	Defend status	Market dominance	Defend status	Competitive advantage	Grow with industry
Ma. Re.	Cost advantage	Defend status	Market dominance	Grow fast	New product	Grow with industry
Sandigliano	Price leader	Defend status	Market dominance	Defend status	Competitive advantage	Grow with industry
Timavo & Tivene	Price leader	Defend status	Market dominance	Grow fast	New product	Grow with industry
Trucco Tessile	Cost advantage	Defend status	-	-	Competitive advantage	Grow with industry

Considering that the companies belong to the same industry and country, their objectives are similar. These goals are from the first classification of Porter's goals.

To center the study in the mitigation strategies of interest, figure 34 shows the correlation between the different types of mitigations strategies and firm's goals.

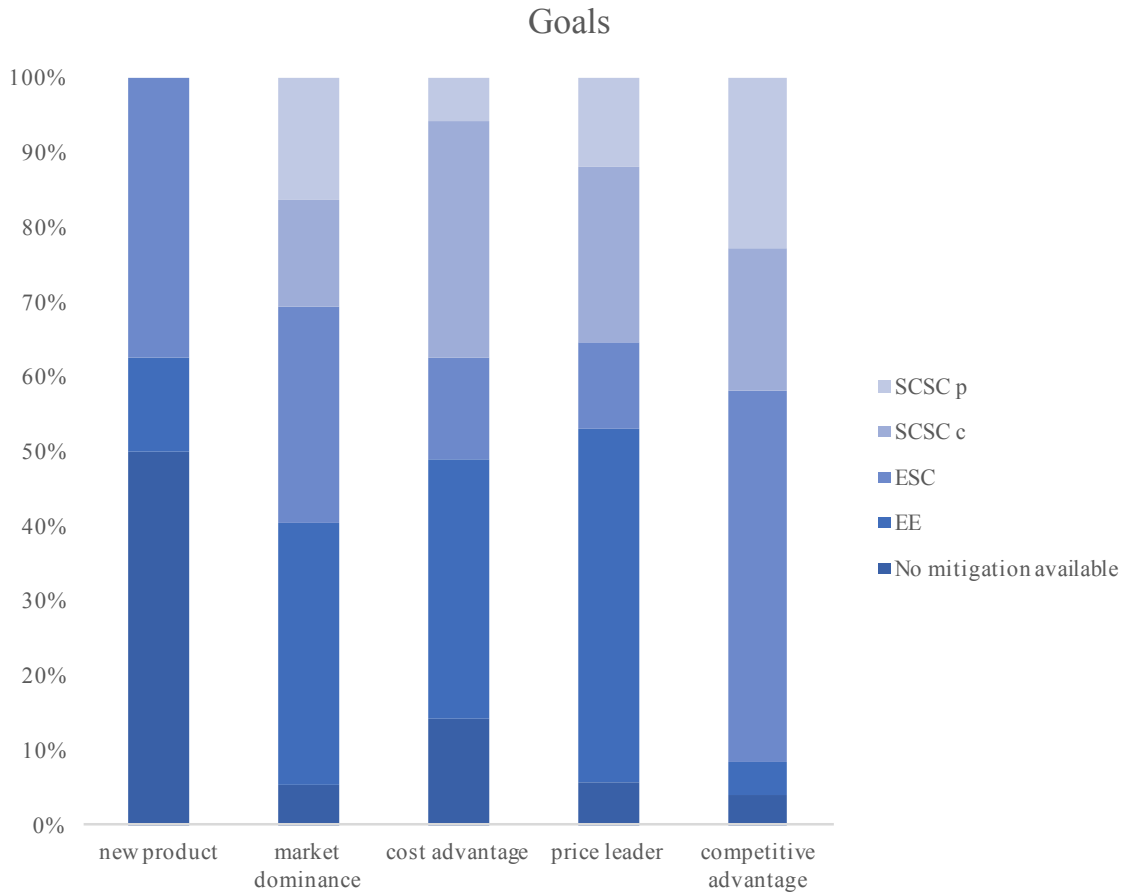

Figure 34: ***Firms' goals vs. Mitigations classification***

Goals are organized from the goal with less Supply chain to supply chain mitigation strategies to *Competitive advantage* goal which has 42% of these mitigations strategies.

Competitive advantage goal is a cooperative goal (Enterprise to Supply chain and Supply chain to supply chain mitigations are more than 90% of the mitigation strategies), where to gain an advantage it is necessary to build long-term relationships with other players in the supply chain. Regarding Li at al (2004) study, Supply chain management has become a potentially valuable of securing competitive advantage and improving organizational performance since competition is no longer between organizations, but among supply chains. The practices considered as enablers of competitive advantage are:

Strategic supplier, Partnership, Customer relationship, Level of information sharing, Quality of information sharing and *Postponement.* The competitive advantages they allow are: *Price/cost, Quality, Delivery dependability, Product innovation* and *Time to market.* In their research, they proved that Supply chain management impacts directly on competitive advantage. In this case, most of the risk mitigations considered are similar to the enablers proposed by Li et al. Competitive advantages such as Quality or Time to market are the ones these supply chains desire and need to achieve. So, Supply chain to supply chain mitigation strategies can be considered enablers of *Competitive advantage* in these supply chains. Furthermore, *Price leader* and *Cost advantage* could also be considered competitive advantages (*Price/cost* in Li et al. research) generating the same conclusions as *Competitive advantage* goal – even though their Supply chain to supply chain occurrence is reduced.

New product goal does not include Supply chain to supply chain mitigations strategies. Developing a new product is usually a process made in-house. The risks that are correlated to this goal such as arresting machinery or product and process innovation, affect other companies but the mitigations strategies are self-focused (Enterprise to enterprise or Enterprise to supply chain). Collaboration between companies or outsourcing capabilities could be proposals for this supply chains to improve current mitigations strategies.

The last company's objective is *Market dominance.* Nearly 30% of their mitigation strategies are Supply chain to supply chain, where approximately half is passive and the other half cooperative. The logical Supply chain to supply chain mitigation strategy for companies that have already achieve Market dominance is Supply chain to supply chain passive – there are dominant players. In this case, the firms are willing to achieve Market

dominance either by growing fast or defending their status. Italfil and Sandigliano which are defending their status could be considered dominant players, and the other companies should experiment growth to fulfill their goal. The average between these different situations could generate "little" Supply chain to supply chain passive mitigation strategies in comparison to what expected for this goal.

Tang's framework

Tang classifies Supply chain management in four macro sources: Supplier Management, Information Management, Demand Management and Product Management. The relationship between mitigations occurrence and Tang's framework is represented in table 41 – stated from higher occurrence to less occurrence in percentage.

Table 41: ***Mitigations' occurrence in Tang's framework***

Tang's Framework Functions	**Occurrence**
Supplier Management	**65,1%**
Supplier relationship	27,4%
Supplier selection process	23,9%
Supplier contracts	8,5%
Supplier order allocation	4,0%
Supplier network design	1,3%
Information Management	**19,1%**
Strategies for fashion products	13,8%
Strategies for functional products	5,3%
Product Management	**9,8%**
Process sequencing	9,3%
Postponement strategy	0,5%
Demand Management	**5,8%**
Shifting demand across time	3,7%

Shifting demand across products	2,1%
Shifting demand across markets	0,0%

Supplier management becomes the critical area for mitigation of risks, even more than demand management or product management. Supply chain management becomes essential to mitigate risks. The relationship between different players in the supply chain is necessary and beneficial – mitigation is not only based on the company itself, but also in the relationships they have with other players of the supply chain.

A correlation between Tang's framework and mitigations strategies classification will be carried out allowing to obtain more appealing conclusions to make emphasis in the study. A division between Tang's different areas will be carried out.

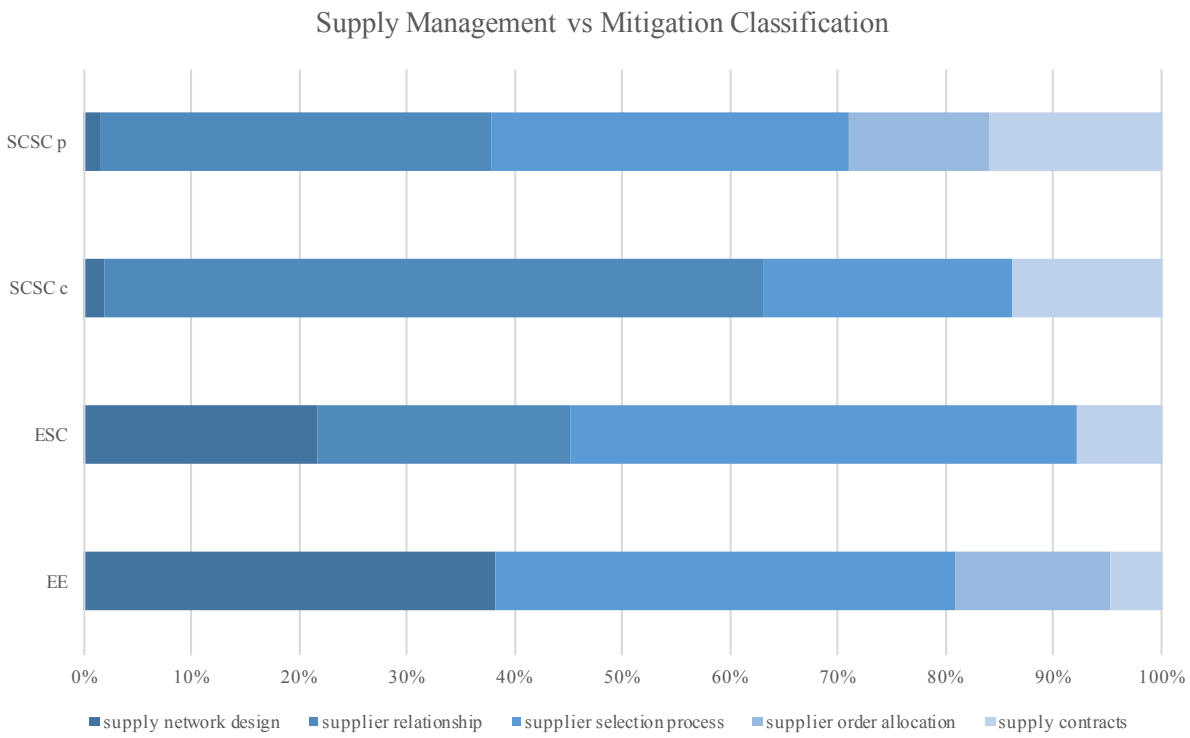

Figure 35: ***Supply Management vs. Mitigations classification***

Nearly all of Supply chain to supply chain mitigations are inside *Supplier relationship* or *Supplier selection* process areas. It is a reasonable conclusion since both issues imply a direct relationship with suppliers. On the other hand, the expected distribution of *Supplier order allocation* is Supply chain to supply chain passive, but some mitigations strategies appear in Enterprise to enterprise mitigations strategies. The risks involved are raw material procurement, costs, and shipment delays. The mitigations proposed for these issues are mainly self-focused, not take into account other players in the supply chain or how these measures could affect them.

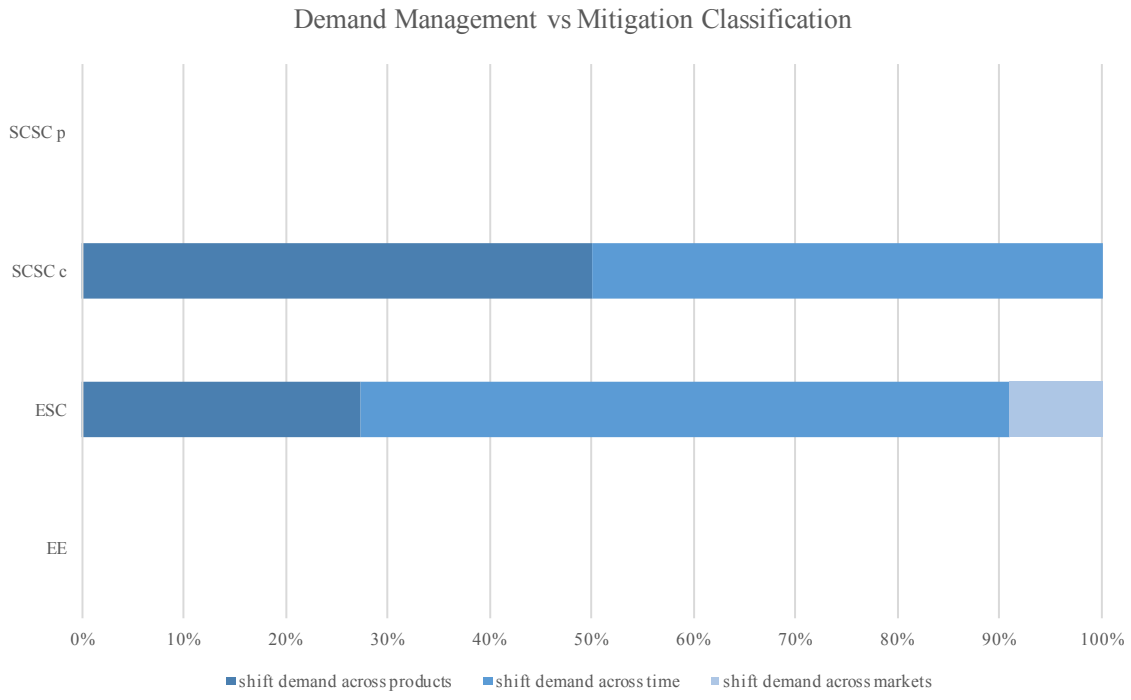

Figure 36: ***Demand Management vs. Mitigations classification***

Demand Management is based on strategies to control demands dynamically to avoid a mismatch with the capacity and mitigate risks involving all the players in the supply chain. Demand is a variable that needs exhaustive surveillance since it may vary through time, season, economic cycle, or even climate. Factors such as political instability or

economic crisis can affect negatively demand. Regarding the importance of demand and the fact that collaboration is essential for these strategies, Enterprise to Enterprise or Supply chain to supply chain passive mitigations strategies are not included in Demand Management. To know about the future or current demand, information sharing between companies is necessary. Some mitigations such as *Shifting demand across markets* can influence in other companies, but this strategy entails inherent benefits for the company applying the mitigation strategy. Cooperative mitigations are 50% inside *Shifting demand across time* and 50% inside *Shifting demand across products* – collaboration and information sharing between minimum two companies is needed for carrying out successfully these strategies.

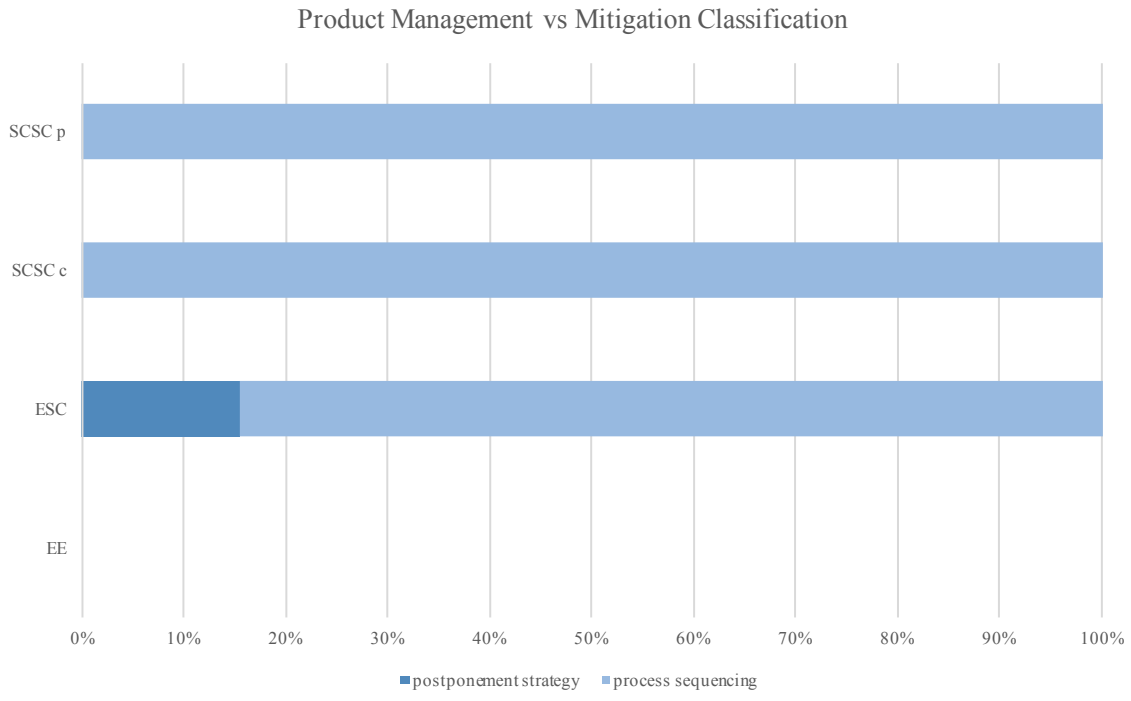

Figure 37: ***Product Management vs. Mitigations classification***

Even though that *Postponement* and *Process sequencing* strategies are self-focused, they influence other companies' operations and, therefore, performance. If a company

becomes flexible, the supply chain will become more flexible too. Some companies can force others to change their operations or their process design. A good example is a case where a company has enough power to change the order of the process forcing other companies to adapt to changes that may only benefit itself.

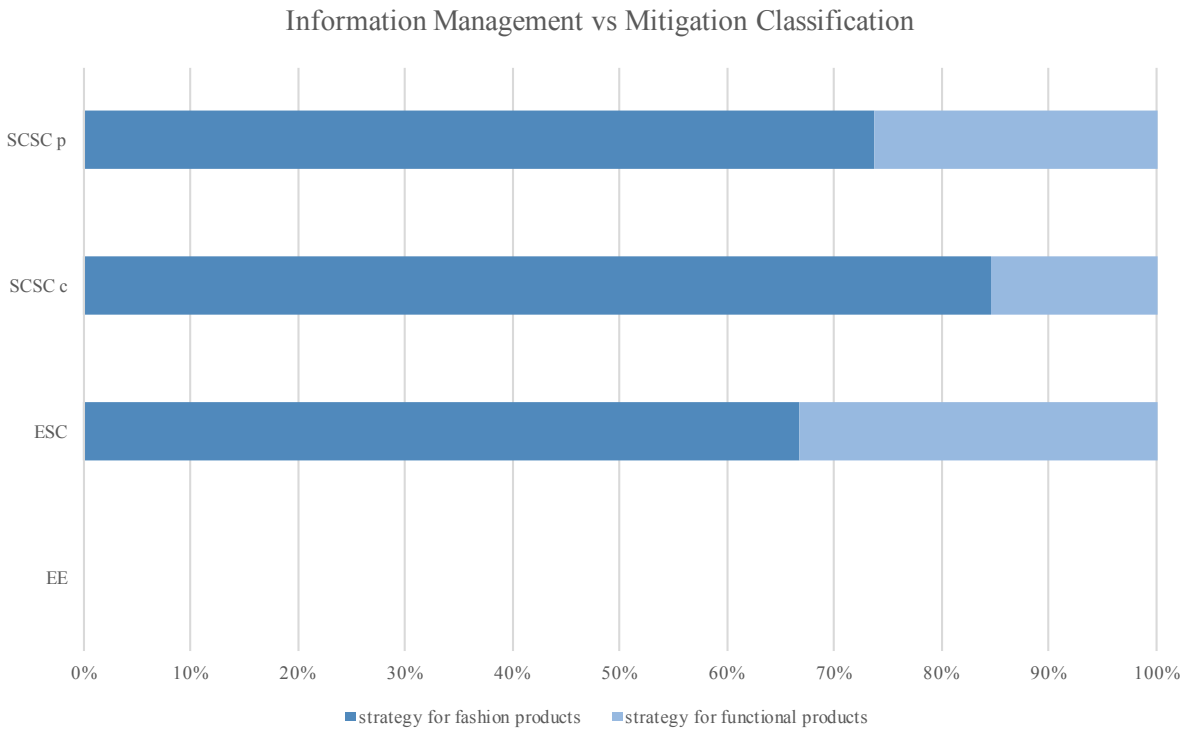

Figure 38: ***Information Management vs. Mitigations classification***

Finally, fisher strategies are included in information management. No Enterprise to enterprise mitigations are considered because these strategies include more than one firm. *Strategies for fashion products* are present in all the other mitigation strategy types. The main products produced in these supply chains are fashionable and will change from one season to another, pushing companies to reduce inventory levels to not become obsolete in a small period.

Firms

The different players of the supply chains would be analyzed to regard how are they mitigating their risks.

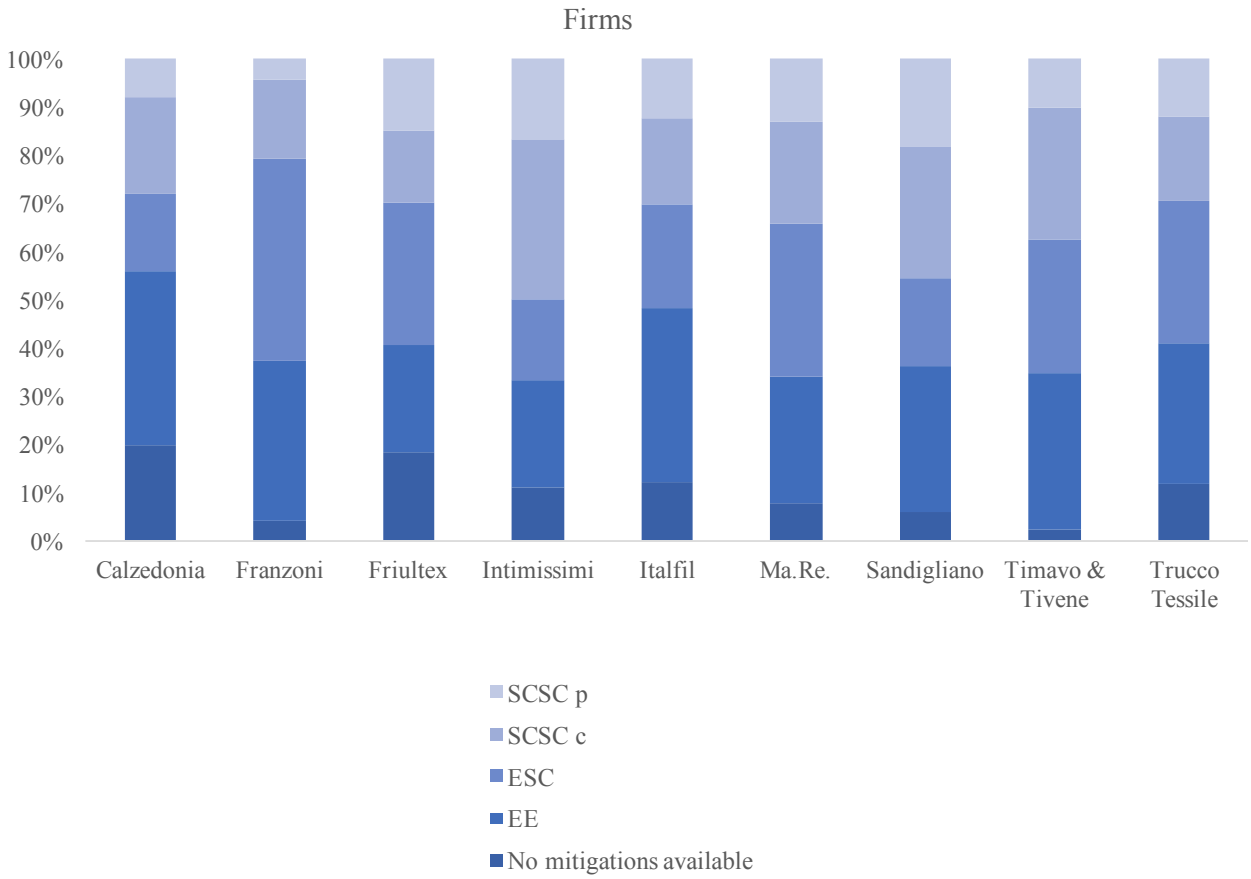

Figure 39: ***Firm vs Mitigations classification***

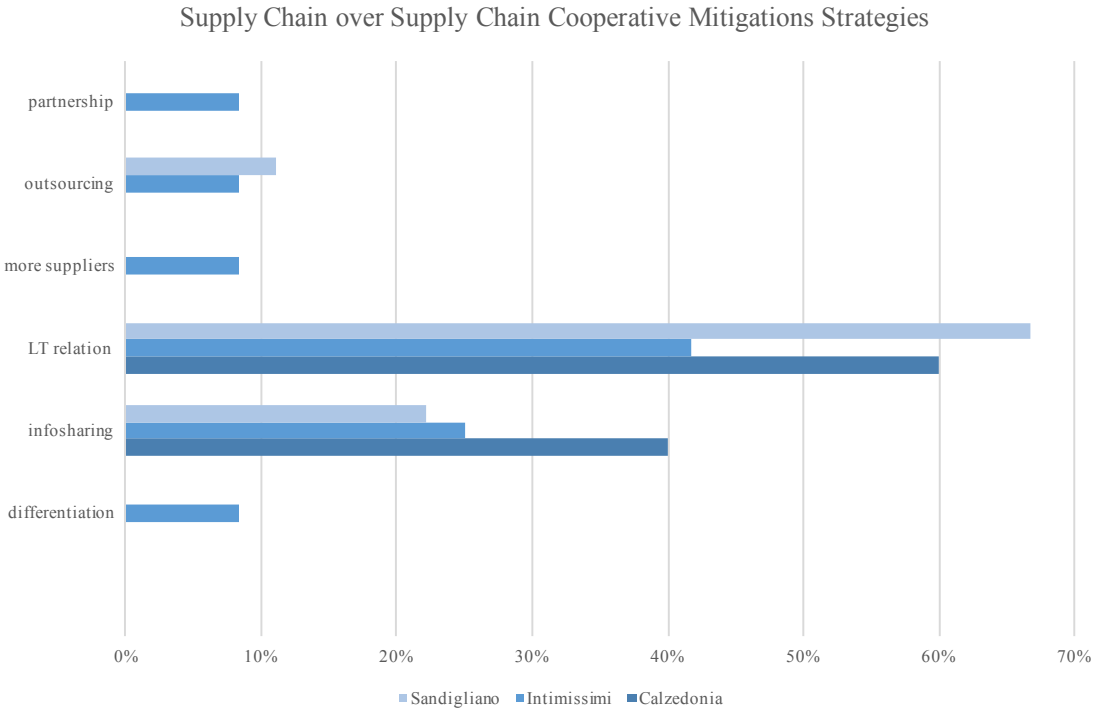

Figure 40: ***Firm vs. Mitigations classification – Detail 1: Possible dominant players – Supply Chain to Supply Chain cooperative mitigations strategies***

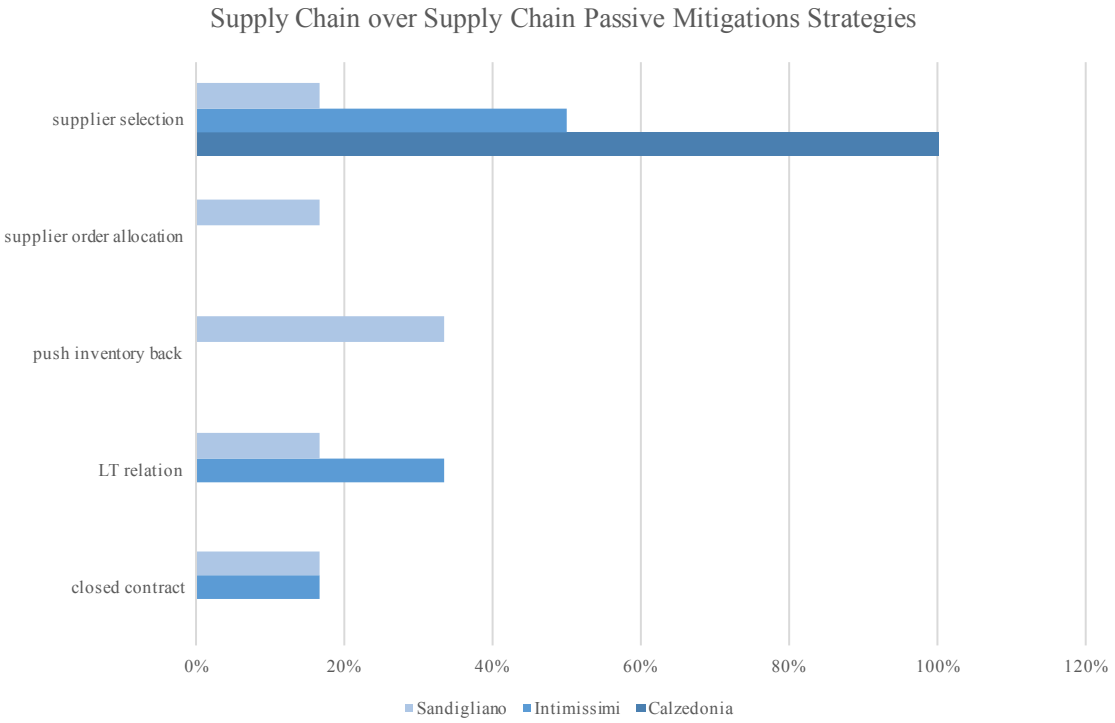

Figure 41: ***Firm vs. Mitigations classification – Detail 2: Possible dominant players – Supply Chain to Supply Chain passive mitigations strategies***

The theoretical ideal in business (from an entrepreneurial perspective) is to be able to put oneself in a position where neither customers, employees, competitors or suppliers can leverage value from you while putting yourself in a position to leverage all of them. It is important to recognize that if one were in this position then assuming that customers value what we provide for them, we would be in a situation of power over all others in our supply chain relationships (Cox, 1999). Calzedonia and Intimissimi are the leading companies generating value in their supply chains due to the brand power effect. Some of the other companies, without them, will suffer from financial weakness, due to the enormous amount of orders Calzedonia and Intimissimi generate, making them dependent on these two companies.

In addition to this, there is evidence that Intimissimi acts as a dominant player in the supply chains. Nearly half of its mitigations strategies are Supply chain to supply chain – where more than 10% are passive. Strategies that involve collaboration and dominance entail the bargaining power the player has. Intimissimi mitigates passively risks with strategies such as *Supplier selection* or establishment of *Long-term relationships*.

Calzedonia only applies Supply chain to supply chain mitigations in less than 40% of the cases. Most of the risks Calzedonia is facing could not be mitigated by compelling other companies to carry out specific strategies. For example, shipment costs risks' mitigation is freight insurance, or international shipment risks are mitigated by building a sorting and shipping yard which do not affect other companies of the supply chain directly.

Sandigliano could also be considered as a dominant player over their suppliers, regarding the high number of Supply chain to supply chain mitigations strategies it is

applying. Other facts such as the real power of this company over others entail that it can be considered a valuable player but not a dominant one. It is the company before Calzedonia in the supply chain Calzedonia –socks. The dominant player is Calzedonia, but Sandilgiano is acting like it because it is facing more risks and forcing Italfil to collaborate or mitigate some of their risks.

Based on these results, the following propositions can be formulated:

Proposition 2: Measurement of market dominance of dominant players

Proposition 3: Research of relationships between different players in the supply chain

Proposition 4: The study that proves that the existence of the dominant player entails collaboration between companies in the supply chain

Firm activity

Firstly, the mitigations classification will be compared with firms' activity.

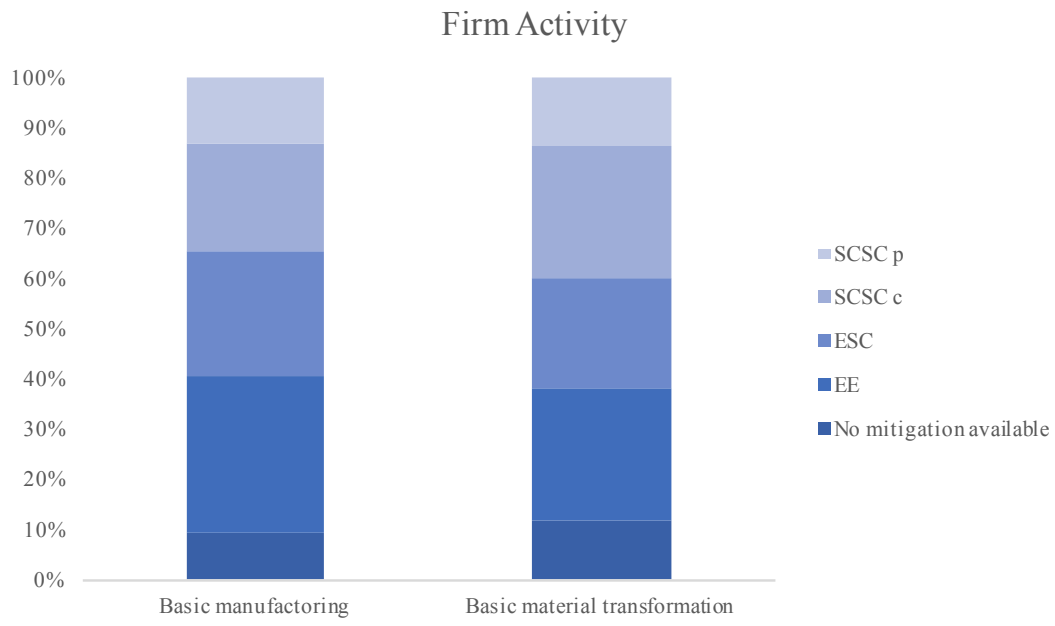

Figure 42: ***Firm activity vs. Mitigations classification***

At first glance, there is no significant difference between both activities when regarding mitigations type. In the companies that carry out basic manufacturing, there is a more significant percentage of Enterprise to Enterprise mitigations than in the other companies. Basic material transformation companies are having more relationships with other players in the supply chain. It could be because these players are in the latest stages of the supply chain, being closer to the dominant players or even being the dominant players themselves. In total, there are more Supply chain to supply chain mitigations in the basic manufacturing players (86 vs. 61), but in percentage, there are more in basic material transformation players (40% vs. 34%).

In this case, no further detailed research about the mitigations of interest will be carried out: no vast difference between both players.

IT level

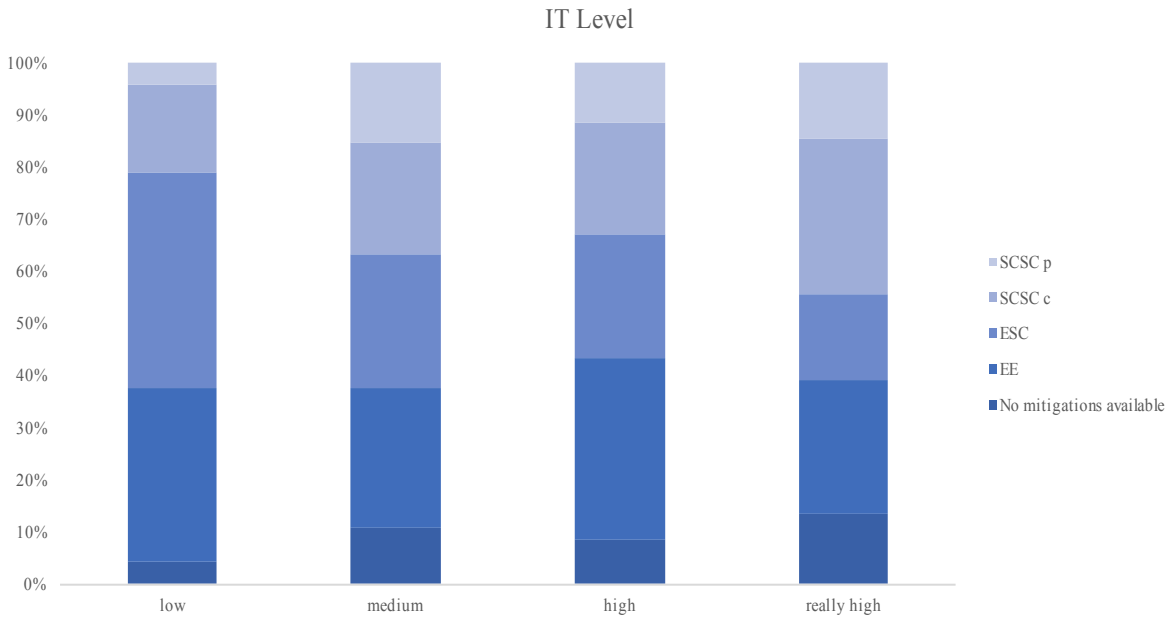

Figure 43: ***IT Level vs. Mitigations classification***

The low IT level entails more Enterprise to Enterprise mitigations than higher levels. For those companies, their mayor risks are internal due to the low IT level, which makes

them expend financial surplus in mitigations over themselves. As aforementioned, there is a trade-off between mitigations and costs. These companies would be less willing to collaborate with other companies if they are facing internal constraints in their operations. Indeed, they will not be able to be obliged to carry out passive mitigations because of their lack of flexibility and response. Their priority is to become more technologize and, then, they will consider other types of mitigations. What this does not mean is that they are not affecting other members of the supply chain with their mitigations strategies – Enterprise to supply chain mitigations are considerably high too in low IT level companies.

There is a definite trend: the more IT level the companies have, the more Supply chain to supply chain mitigations and the less Enterprise to supply chain mitigations. The collaboration and cooperation between companies grow with the IT level. Mitigations change from Enterprise to supply chain – more self-focus mitigations- to Supply chain to supply chain mitigations – collaborative and cooperative or passive mitigations.

Due to the existence of this relationship, a more in-depth analysis of the mitigations strategies of interest will be carried out.

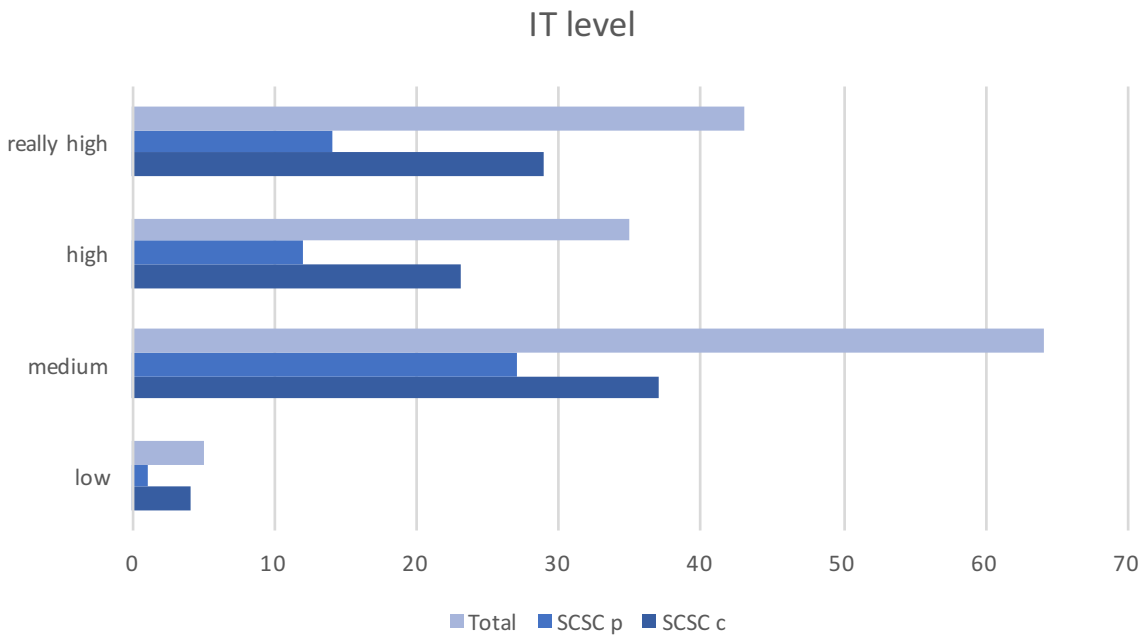

Figure 44: ***IT Level vs Mitigations classification – Detail 1: Number***

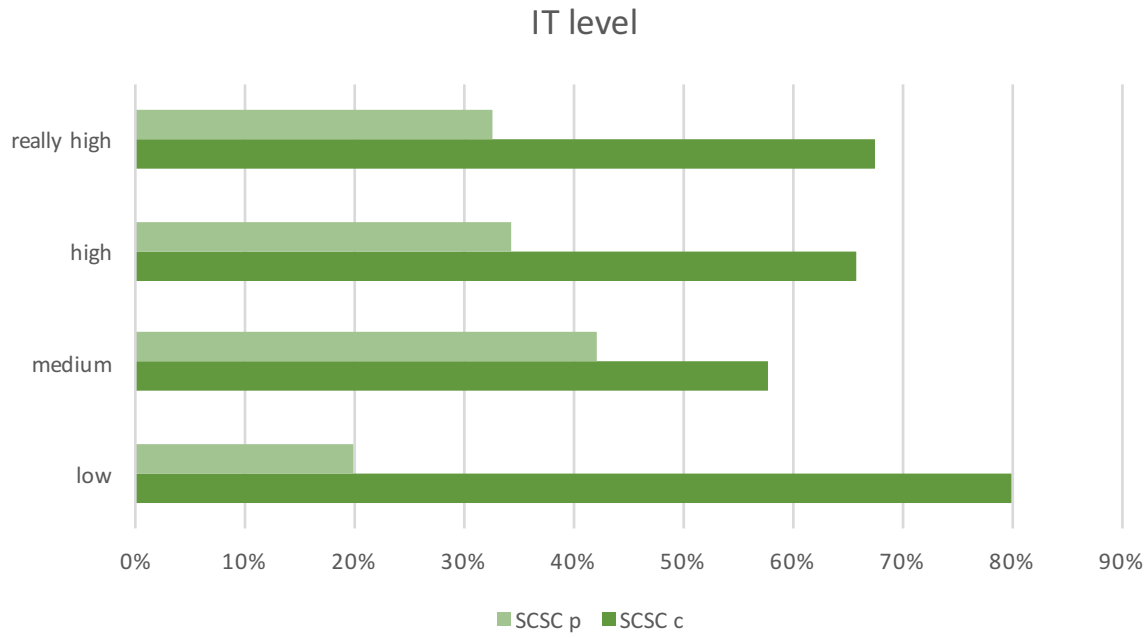

Figure 45: IT ***Level vs. Mitigations classification – Detail 2: Percentage***

The number of mitigations in the companies with low IT level is small – less than ten. The only company in the sample with low IT level is Franzoni. It can be concluded

that it is not representative to make conclusions about those types of firms since it can be an exception to this problem.

There is a trend considering the other three levels: the larger the IT level, the higher Supply chain to supply chain cooperative mitigations and the less the passive mitigations strategies. Most of the companies analyzed have a medium IT level. The firms with really high IT level are Calzedonia and Intimissimi – dominant players. The results are not as expected, the Supply chain to supply chain passive should appear more in the dominant players and less in little companies with less power entailing that there are some firms in the supply chain more potent than others and that carry out mitigations that affect the last ones considerably.

It is a similar conclusion to Barau's (2015) study conclusion. Relationship with suppliers, customers, and among organizational, functional units enhance knowledge creation, innovation orientation and consequently improve the supply chain performance. This finding is similar but not directly related to Chen et al. (2013) who found an indirect effect of marketing capability on the relationship between collaborative communication and customer performance. IT can provide better platforms for interaction between companies, providing a better environment for collaboration and relationship between companies. When companies have high IT levels, they usually also have funding for huge investments, making them perfect candidates for a dominant player role.

In conclusion, IT can also provide better platforms for interaction between companies, providing a better environment for collaboration and relationship between companies. When companies have IT levels, they usually also have funding for huge investments, making them perfect candidates for a dominant player role.

Based on the results, the following propositions are posited:

Proposition 5: Measurement of the correlation of high IT level and dominant player role

Proposition 6: Measurement of the correlation of large firms and dominant player role

Substitutability

Regarding the abovementioned, a firm can be considered a strategic resource for the supply chain. Future goals could be stated measuring its substitutability inside the supply chain of study. For example, a firm could become indispensable by differentiating or by reducing costs and price in comparison to its competitors.

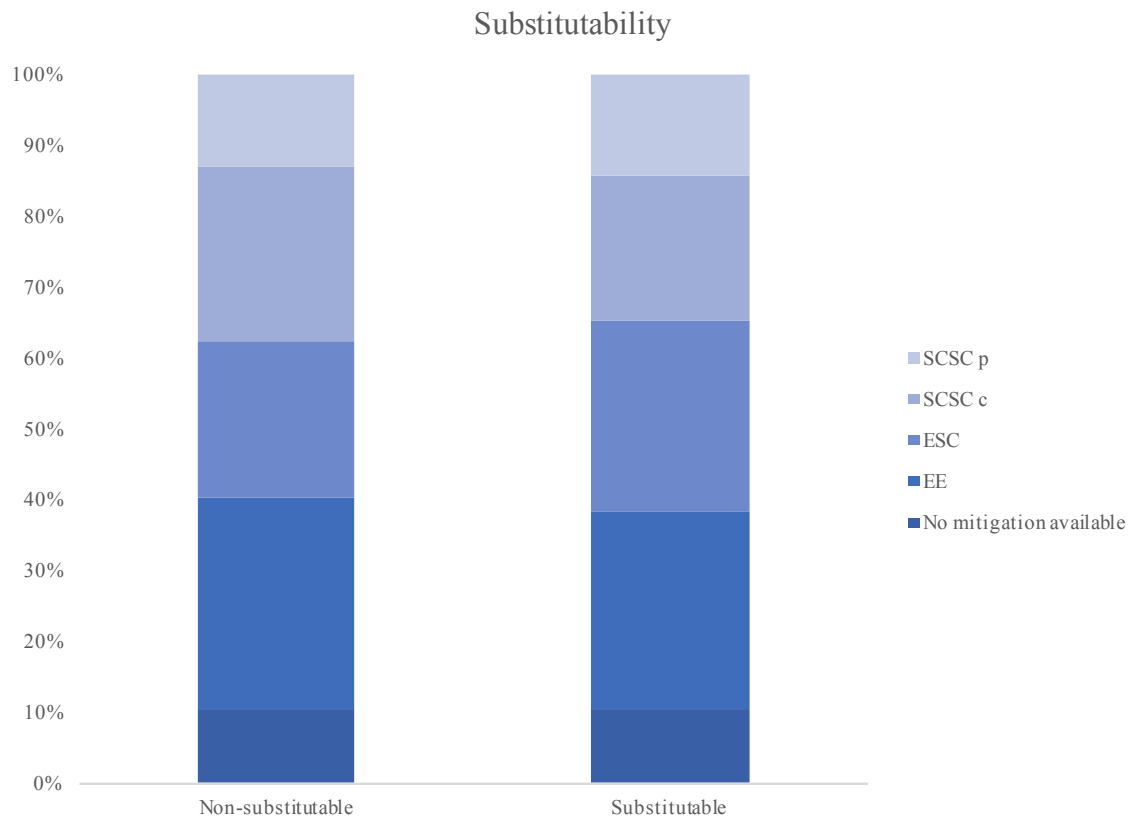

Figure 46: ***Substitutability vs. Mitigations classification***

There is no clear trend considering the relationship between substitutability and the mitigations strategies classification. Both cases have a similar percentage of each type of mitigations.

Information sharing

Information sharing is a relevant point for firm's strategy and to measure the relationship between firms in the supply chain. In the following figure, it would be compared with the mitigations in consideration.

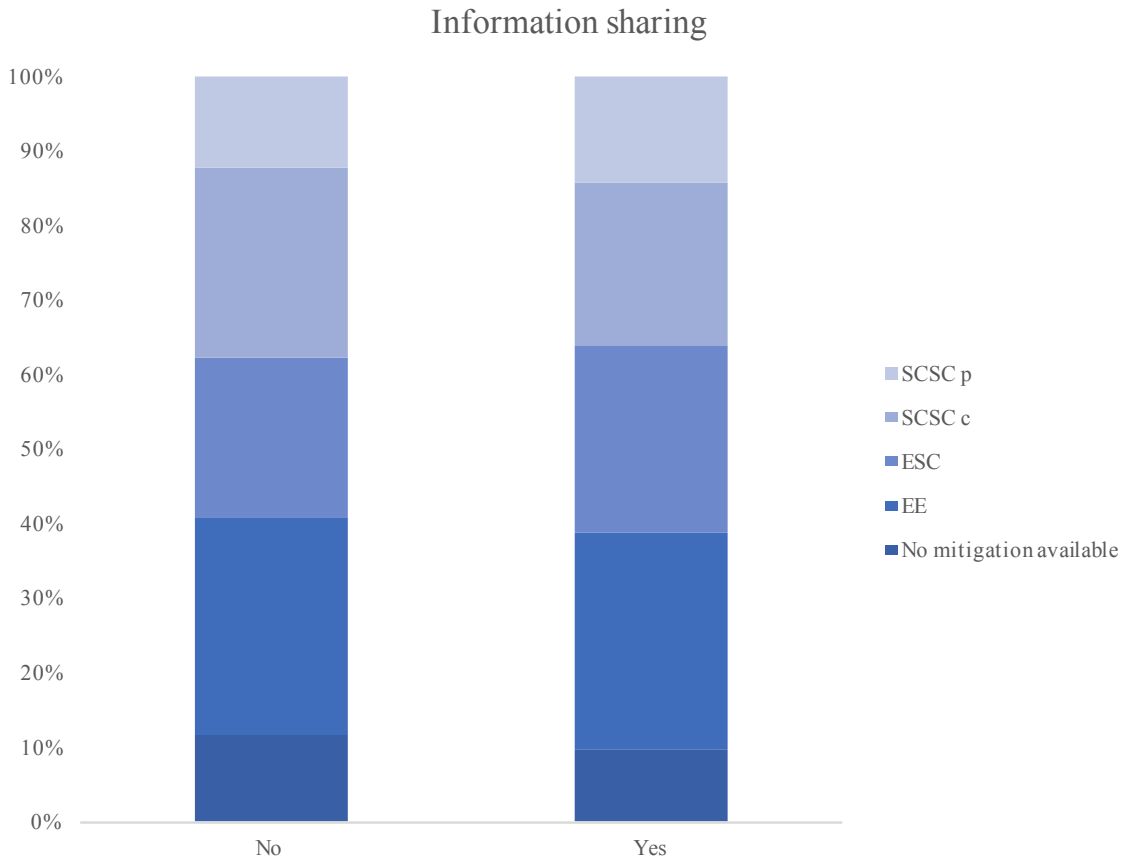

Figure 47: ***Information sharing vs. Mitigations classification***

There is no clear trend between these variables – mitigations are in similar proportion in both cases: information sharing and no information sharing. What could be expected from this relationship is that information sharing companies will have more Supply chain

to supply chain mitigations. However, the results prove that the percentage is nearly the same when they share information and when they do not (37% vs. 35%).

Firm size

An analysis is done to regard the correlation between firm size and mitigations strategies.

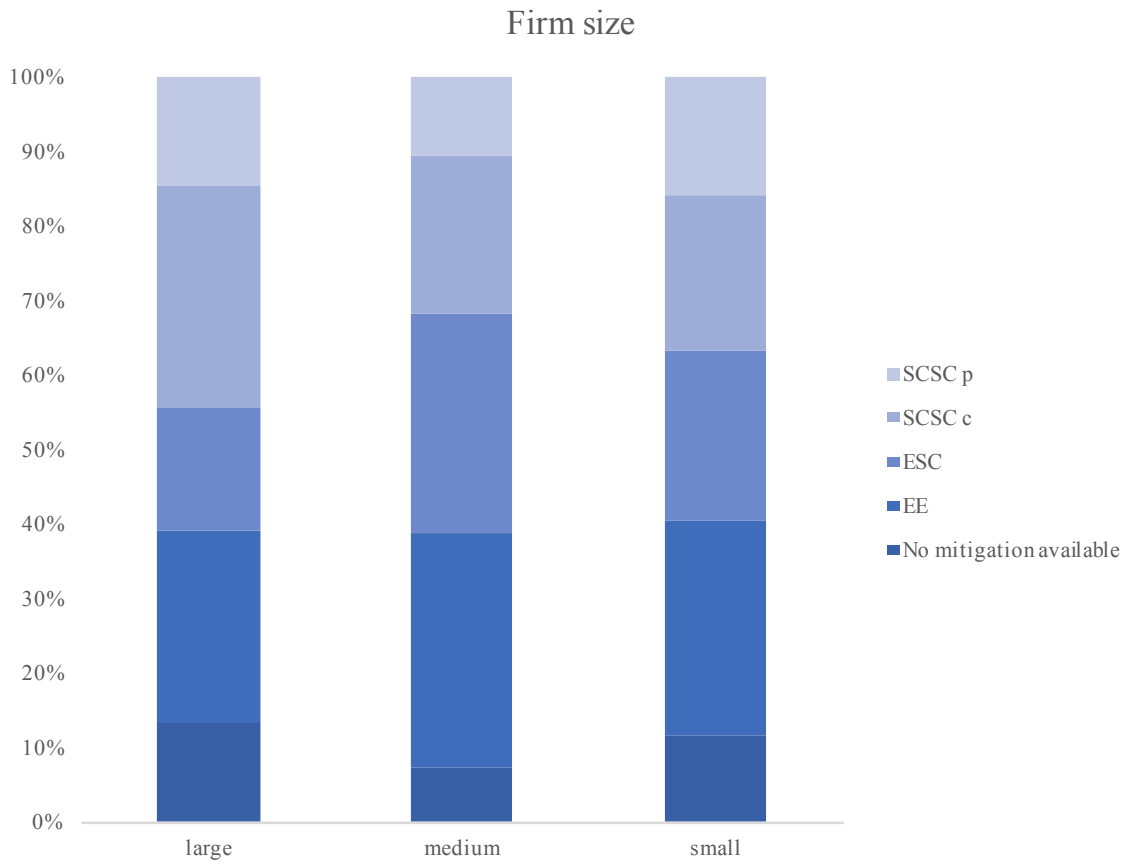

Figure 48: ***Firm size vs. Mitigations classification***

The smaller the size, the higher are Enterprise to enterprise mitigations. Supply chain to supply chain mitigations strategies are carried out in a more significant proportion in large companies since they have more means to collaborate. Medium and small companies are usually more self-focused: their performance and risks are their primary concerns. Their

capabilities are limited due to less personnel and flexibility, so their mitigations are mainly Enterprise to Enterprise mitigations.

IT level could be correlated to the size of the company, providing the same conclusions than when this variable was studied. The following figure shows the correlation between firm's IT level and size.

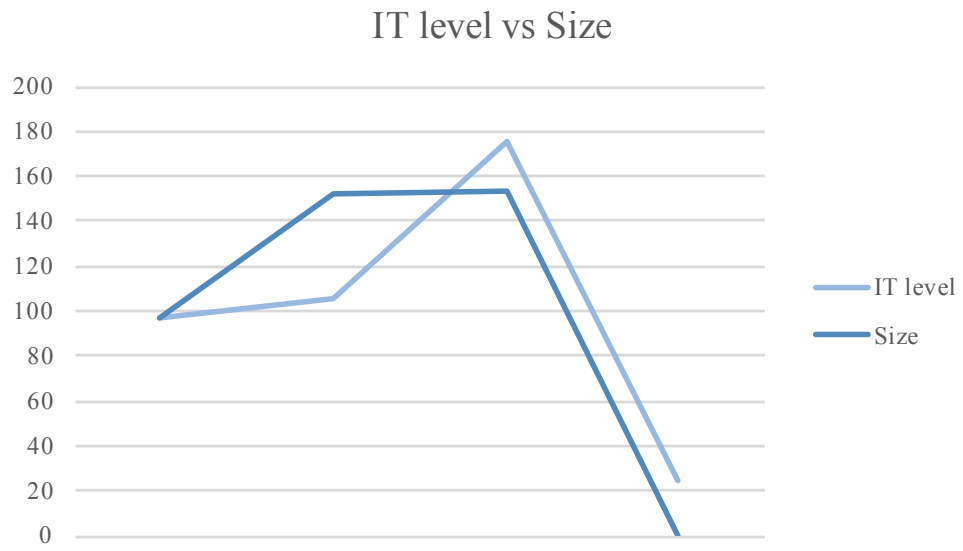

Figure 49: ***Firm size vs. IT level***

There is a correlation between the size of the company and IT level. So, the same conclusions for IT level apply to firm's size. Del Aguila-Obra et al. (2006) founded that contrary to the literature suggestions, the size of the company does not have any effect on the availability of Internet technologies, but it does for managerial capabilities. The smaller the size of the firm, the higher the possibilities of using the external advice in adopting Internet technologies, because small firms usually have fewer managerial capabilities. In the meantime, more sophisticated technology development was identified in larger firms. If larger firms are more opened to technology, the same conclusions as before could be drawn: larger firms promote collaboration and have more power in their supply chains.

Other variables

Correlation analysis will be carried out to regard the relationship between Supply chain to supply chain passive or collaborative mitigation strategies and other factors of the firm. In addition, punctuation was made to consider variables such as information sharing where the information available is yes or no. For example, if yes 1 and if no 0, and then they were normalized in percentage to get more precise results.

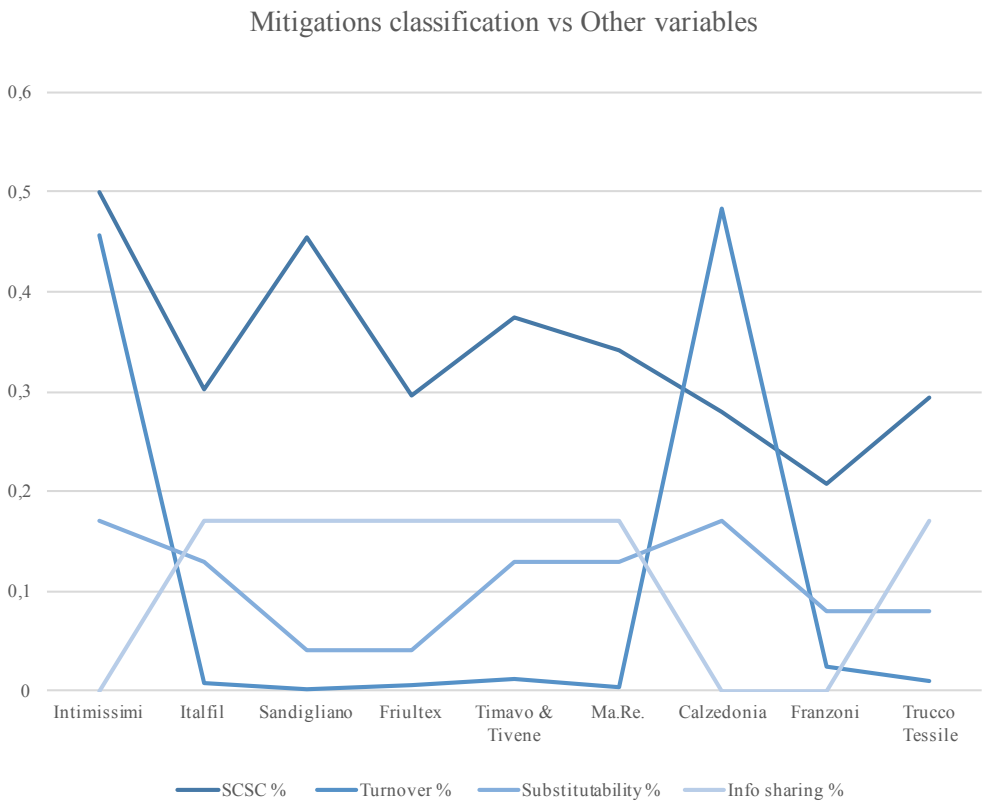

Figure 50: ***Mitigations classification vs. Other variables***

The analysis made did not exhibit any correlation between mitigations of interest and financial position or market power. Lack of some crucial information such as financial statements, relationships between firms or information about the market in Italy could widen the research.

Based on the results, the following propositions are posited:

Proposition 7: Research of possible variables that correlate with mitigations strategies where more than two players in the supply chain are involved

Proposition 8: Measurement of the correlation between dominant player role and substitutability risk

Proposition 9: Measurement of the correlation between the existence of a dominant player and information sharing in the supply chain

Summary of Propositions

Based on the results, the following propositions are proposed for future research:

Proposition 1: Proposal of different mitigations strategies for the risk of higher exposure

Proposition 2: Measurement of market dominance of dominant players

Proposition 3: Research of relationships between different players in the supply chain

Proposition 4: The study that proves that the existence of the dominant player entails collaboration between companies in the supply chain

Proposition 5: Measurement of the correlation of high IT level and dominant player role

Proposition 6: Measurement of the correlation of large firms and dominant player role

Proposition 7: Research of possible variables that correlate with mitigations strategies where more than two players of the supply chain are involved

Proposition 8: Measurement of the correlation between dominant player role and substitutability risk

Proposition 9: Measurement of the correlation between the existence of a dominant player and information sharing in the supply chain

CHAPTER 6

CONCLUSION

The research answers the **RQ1: How do textile companies mitigate supply chain risks?** The risks of most exposure are *Financial handling/practice* and *Operational disruption*. Regarding the risks considered (54), the most common mitigations strategies (39) are: *Long-term relationships, Long-term planning*, and *Information Sharing*. Two of these mitigations strategies imply more than one company in the supply chain that leads to the third research question **RQ3: How do Supply chain to Supply chain passive or cooperative could improve the reputation, financial position, market power…of a company?** Supply chain to supply chain mitigations strategies imply more than one firm is collaborating or being forced to mitigate risks by another one. The analysis made did not exhibit any correlation between mitigations where two firms where involve and financial position or market power. A further analysis where information available is more relevant for the case and could be used to measure better these variables - such as financial statements of each company and financial variables of the supply chains – could increase consistency and reliability of conclusions.

In the analysis, nearly 60% are Enterprise mitigations, but there is a considerable 40% of Supply chain to supply chain mitigations. Carrying out an in-depth analysis of Supply chain to supply chain cooperative mitigations strategies, sharing information and establishing a long-term, stable relationship with suppliers seems to be the most effective strategies in these companies – both parts must obtain benefits from the agreement. Information sharing is crucial for the founding of this type of relationships, without it, trust or mutual dependence could not be established. A fact that can influence positively in this

is geographical closeness. These companies are all based in Italy sharing the same culture, social connections, and background – conditions for generating homophilic relationships between them, encouraging collaboration between them.

Several studies regard the relationship between Supply chain risk management and company's performance. The analysis made did not exhibit any correlation between mitigations where two firms where involve and financial position or market power. A further analysis where information available is more relevant for the case and could be used to measure better these variables - such as financial statements of each company and financial variables of the supply chains – could increase consistency and reliability of conclusions.

Moving forward to **RQ2: How acts the leader in a supply chain? Is it powerful enough to influence on supply chain companies' decisions?** The dominant players of the supply chains are Calzedonia and Intimissimi. Both companies are from the textile world and belong to Calzedonia Agrupar. There is evidence in the study that the risk of *Substitutability*, can push firms to mitigate it by *Differentiation* or *Product innovation*. The dominant player has in its hands the election of supplier and could substitute one firm with another one, affecting considerably the firm that is substituted. If the firm innovates or differentiates in some way – appealing competitive advantages for the supply chain, the dominant player could reconsider the substitution that could be fatal for the non-dominant player. This evidences that these strategies could improve market power or innovation of firms. On the other hand, the pressure that the dominant player exerts over other players could motivate the opposite finishing with the default of the non-dominant company – great investments and lack of permanence in the supply chain.

When it comes to Supply chain to supply chain passive mitigation strategies, *Pull contract* is the highest in occurrence entailing that some companies of the supply chain have less bargaining power than others that are pushing their inventory responsibility back in the supply chain, forcing companies to assume all the risk. This strategy only benefits one player in the supply chain and, usually, causes detriment to the others.

Concluding, there is evidence of the power dominant players have over the non-dominant players in this supply chains. Companies in these supply chains are following recommendations or decisions that the dominant player has took or will take. Calzedonia and Intimissimi are both large-size companies and have a turnover of more than 60% of the other firms in their supply chains.

Coming back to **RQ3**, innovation, and entrepreneurship can be driven from the examples before of Supply chain to supply chain passive mitigations strategies - *Differentiation* or *Product innovation*. These could be considered benefits of these mitigations strategies. Cons may be more extensive for non-dominant players than innovation or another type of beneficial advantage.

The most important part of the analysis focuses on **RQ4: In what variables does Supply chain to supply chain mitigations strategies influence?** Existing literature usually does not study Supply chain to supply chain mitigations. This fact makes the analysis more demanding and challenging. Different frameworks and classifications were considered to lead to broadened conclusions. Two risks classifications were mixed: Musa and Dittman. Regarding only Musa, the flow with the most significant percentage of Supply chain to supply chain mitigations is *Information flow* with more than 90% of total occurrence while *Financial flow* only has 22% of Supply chain to supply chain mitigations

and *Material flow* 33% in total. The results do not differ from what it is expected. Material flow risks are risks where movement of objects is implied being usually self-focused risks. The only mitigation strategy inside the Material flow risk that could regard two players of the supply chain is *Supply chain partners' relationships*. Even though *Financial flow risks* affect all players in a supply chain, their mitigations strategies are mostly self-centered as it can be derived from the analysis. For example, if one player is struggling financially, its bankruptcy may carry consequences on every player in the supply chain – with different levels of severity on each one. The mitigations for these risks usually are selling assets, liquidating products or reducing unnecessary costs. All of them are based on the firm itself, not considering any other player of the supply chain.

Finally, the *Information flow risk* regards the communication between different players: demand, inventory forecasts or order fulfillment could not be carried out correctly without this flow. It is vital that *Information flow risks* are controlled considering it implies value-creation, and it is the flow that connects material flow and financial flow. Since most of the mitigations are Supply chain to supply chain, it could be concluded that the flow in these supply chain is working correctly. Collaboration and cooperation for reducing and controlling the risks of the supply chain is the optimal solution for this problem. A firm working alone on risks entails a reduction in resources and capability.

Considering Dittman's classification, Level 2 – External value chain risks is where risks of interactions between different players of the supply chain are classified. For this reason, it is the level with the highest percentage of Supply chain to supply chain mitigations, both passive and collaborative. In the other levels, the occurrence of these mitigations is insignificant which does not lead to unexpected conclusions. Adding Musa's

framework, Operational risks: Material flow – Make, it is profoundly affected by other members of the supply chain due to the main mitigations that appear in that flow: Supply chain to supply chain cooperative. So, mitigating an operational risk in collaboration with another player of the supply chain brings to the supply chain a better solution than other self-oriented mitigations strategies. Betts and Tadisina research (2009) entails the same conclusion about operations and collaboration. They listed some benefits of collaboration which are linked to operations such as the operational flexibility to cope with demand uncertainties, increased sales, improved forecasts, more accurate and timely information, reduced costs, reduced inventory or exchanges of knowledge about products and processes. Supply chain to supply chain passive mitigations are also mainly in Operations but, in this case, in Material Flow – Deliver. Demand uncertainties are one of the leading problems in the supply chain – inventory management is highly linked to it. So, Supply chain to supply chain passive mitigations entails demand management.

The last framework considered for risks and mitigations is Tang. Tang classifies Supply chain management in four macro sources: Supplier Management, Information Management, Demand Management and Product Management. In these supply chains, supplier management becomes the critical area for mitigation of risks, even more than demand management or product management. Supply chain management becomes essential to mitigate risks. The relationship between different players in the supply chain is necessary and beneficial – mitigation is not only based on the company itself, but also in the relationships they have with other players of the supply chain. Nearly all of Supply chain to supply chain mitigations are inside *Supplier relationship* or *Supplier selection* process areas. It is a reasonable conclusion since both issues imply a direct relationship

with suppliers. When it comes to Demand management and the fact that collaboration is essential for it, These supply chains do not include Enterprise to enterprise or Supply chain to supply chain passive mitigations strategies. To know about the future or current demand, information sharing between companies is necessary. Finally, fisher strategies are included in information management. No Enterprise to enterprise mitigations are considered since these strategies include more than one firm. *Strategies for fashion products* are present in all the other mitigation strategy types. The main products produced in these supply chains are fashionable and changes from one season to another, pushing companies to reduce inventory levels to not become obsolete in a small period.

Intimissimi acts as a dominant player in the supply chains. Nearly half of their mitigations strategies are Supply chain to supply chain – where more than 10% are passive, while Calzedonia only nearly 40%. Sandigliano could also be considered as a dominant player over their suppliers, regarding the high number of Supply chain to supply chain mitigations strategies that they are applying but considering other facts such as the real power of this company over others, it can be considered a valuable player but not a dominant one.

Intimissimi is a dominant player in its supply chain while Calzedonia cannot be considered one regarding only its mitigations strategies. Most of the risks Calzedonia is facing could not be mitigated by compelling other companies to carry out specific strategies. For example, shipment costs risks' mitigation is freight insurance, or international shipment risks are mitigated by building a sorting and shipping yard which do not affect other companies of the supply chain. The company before Calzedonia in the supply chain Calzedonia –socks is Sandigliano. This analysis could entail that the dominant

player it is Calzedonia, but Sandilgiano is acting like it because it is facing more risks and forcing Italfil to collaborate or mitigate some of their risks.

More variables where correlated with Supply chain to supply chain mitigations strategies such as substitutability or the existence of information sharing between firms, only IT level and firm size had a definite trend. The low IT level entails more Enterprise to Enterprise mitigations than higher levels. For those companies, their mayor risks are internal due to the low IT level, which makes them expend financial surplus in mitigations over themselves. These companies would be less willing to collaborate with other companies if they are facing internal constraints in their operations. Indeed, they are not able to be obliged to carry out passive mitigations because of their lack of flexibility and response. Their priority is to become more technologize and, then, they consider other types of mitigations. What this does not mean is that they are not affecting other members of the supply chain with their mitigations strategies – Enterprise to supply chain mitigations are considerably high too in low IT level companies. So, collaboration and cooperation between companies grow with the IT level. The results are not as expected, the Supply chain to supply chain passive should appear more in the dominant players (really high IT level) and less in little companies with less power. Some firms in the supply chain are more potent than others, and they are carrying out mitigations that affect non-dominant players considerably.

IT can also provide better platforms for interaction between companies, providing a better environment for collaboration and relationship between companies. When companies have high IT levels, they usually also have funding for huge investments, making them perfect candidates for a dominant player role. In addition, there is a

correlation between the size of the company and IT level, so the same conclusions apply to firm size.

Finally, **RQ5: Strategic proposals for European textile companies based on their risks and current mitigation strategies** is answered considering Porter's study. As in Dittman-Musa's framework, operations are the most affected by risks. "Fast fashion" plays a determinant role in this conclusion. Operations must be flexible and able to fulfill orders in a short period. If risks are affecting them, the company is weakened, which can be detrimental to other business units such as finance or service. So, the first proposal i*s:*

Recommendation 1: Exhaustive control when it comes to operational risks

Several studies claim that Supply chain risk management boosts performance such as Lavastre, Gunasekaran, & Spalanzani (2011).

Regarding risk exposure, Marketing and Sales and Inbound Logistics are the critical areas in this case. The risks with the highest exposure belong to Marketing and Sales and Operations, and their occurrence is also high which leads to the second proposal:

Recommendation 2: Collaborative mitigations for risks with such a high occurrence should be considered. If companies of the same supply chain work together against specific risks, the effectiveness of mitigations strategies would be higher than alone.

This type of mitigations is usually less expensive than Enterprise to Enterprise mitigations – since another firm is involved too – but, at the same time, there are more challenging to implement – collaboration or power is needed. The primary function with the most significant percentage of the mitigations of interest is Service followed by Inbound logistics – in both cases close to 90%. A curious fact is that Supply chain to supply chain collaborative mitigations are not considered when it comes to supporting activities.

Considering the goals of these supply chains, the first goal of all supply chains is *the Price leader*, and the mean for achieving this goal is *Defending their status in the industry*. The second objectives of the supply chains are *Contraction/Expansion* for Intimissimi - Silk wool and *Global Supply Chain* for Intimissimi – Underwear and Calzedonia – Socks. All the supply chains achieve their goal by *Growing fast*. The third goal is *Global Supply Chain* for Intimissimi – Silk wool and *Introducing a new product* for the other two supply chains. The mean for achieving their objectives, in this case, is *Grow with industry* in all the cases.

When it comes to the goals of the firms, *Competitive advantage* goal is a cooperative goal where to gain an advantage it is necessary to build long-term relationships with other players in the supply chain – similar to Proposal 2. So, Supply chain to Supply chain mitigation strategies can be considered enablers of *Competitive advantage* in these supply chains – evidence of the relationship between these strategies and fulfillment of firms' goals. Furthermore, *Price leader* and *Cost advantage* could also be considered competitive advantages (*Price/cost* in Li et al. research) generating the same conclusions as *Competitive advantage* goal – even though their Supply chain to Supply chain mitigation occurrence is reduced.

New product goal does not include Supply chain to supply chain mitigations strategies. Developing a new product is usually a process made in-house. Based on this, the following proposal can be formulated:

> **Recommendation 3:** Collaboration between companies or outsourcing capabilities could be proposals for these supply chains to improve current strategies for mitigating risks.

The last company's objective is *Market dominance.* Nearly 30% of their mitigation strategies are Supply chain to Supply chain. The logical Supply chain to supply chain mitigation strategy for companies that have already achieve Market dominance is Supply chain to supply chain passive – there are dominant players. In this case, the firms are willing to achieve Market dominance either by growing fast or defending their status. For growing fast, collaboration could be a right mean – which leads to Proposal 3.

The last proposal regards the dominant player:

Recommendation 4: dominant players should consider other mitigation strategies, such as cooperative that benefits both.

If the mitigation strategy only benefits itself, it can cause problems in the non-dominant firm that, in the end, rebind negatively on the dominant player. Current research trends imply that the new competition is between supply chains and not between firms. If these non-collaborative mitigations harm the supply chain, passive strategies can negatively affect the fulfillment of competitive advantages.

The proposals made are based on the study but could be broadened to European textile industry due to their generic nature.

Future research will be devoted to studying the propositions highlighting other relationships between variables, new proposals for mitigating risks and more information about the role the dominant player has in the supply chains.

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