**An Executive Summary For the Digitalisation of Pampered Pets.**

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# **Introduction**

Online sales have revolutionised commerce, with 53% of small businesses making most of their sales online (Morell, 2024). To capitalise on this statistic, Pampered Pets is embracing digital transformation. They will create an online presence with a cloud broker, adopt an international supply chain, and utilise automated warehouses worldwide. This is expected to boost their customer base and global reach significantly.

Two high-profile new customers are worried about how these changes may affect the products' world-famous quality and the supply chain's security. Pampered Pets recognises these risks will impact the company’s reputation and market expansion. This document addresses these concerns using the risk assessment approach from NIST SP 800-30, known for its systematic analysis methodology (Oliver, 2024). Specifically, it:

* Enumerates and assesses the risks regarding international supply chains and automated warehouses.
* Estimates the probability that supply chain security and product quality are endangered.
* Outlines a risk mitigation strategy.
* Provides a Business Continuity/Disaster Recovery Plan to ensure a continued online presence.

The risks regarding the cloud broker have been detailed in the previous report and are, therefore, outside the scope of this Executive Summary.

# **Risk Assessment Approach**

To ensure the quality and security of the supply chain, mitigations need to be implemented to tolerate, treat, transfer, or terminate these risks (AIRMIC, 2010). The risks applicable to the business’s requirements will be enumerated to do this. They will then be assessed using a quantitative approach.

Due to the expected boost to the business, a quantitative approach is preferred over a qualitative one. A qualitative approach (assigning categories to risks such as “high”, “medium”, or “low”) oversimplifies the process and provides little value in distinguishing large risks from small (Cox, 2005). A quantitative metric is more convincing, although accurate data is important (Olson, 2020).

One method to use is Bayes' Theorem, as each risk can be viewed as a "conditional probability." This will be used to assess the probability of quality loss and the probability of a supply chain breach. Historical data will be used as best as possible, providing a basis for assumptions when necessary.

A challenge with Bayes' Theorem is the absence of academic data regarding the probability of each risk occurring within a supply chain. Furthermore, establishing a "clearly defined, agreed-upon probability" will make it difficult to analyse enumerated risks (Gilboa, 2013). Multiple criteria can be used to evaluate risks; no obvious metric can be applied to all of them.

For this reason, a Multiple Criteria Decision Analysis approach, specifically a Weighted Sum Model, has been selected to assess the enumerated risks. Munich Business School (N.D.) describes a Weighted Sum Model as incorporating qualitative and quantitative data to systematically weigh and evaluate independent criteria.

Below, Figure One shows the process from selecting and weighting criteria against business requirements to producing the Total Weighted Score.

*Figure One (Above): The Weighted Sum model process.*

The criteria and their weights to be used are as follows:

* **Impact on quality** 0.3
* **Impact on security** 0.3
* **Likelihood** 0.2
* **Cost** 0.2

The first two have been given a heavier weight to correlate with the concerns of the high-profile customers. While there is an element of subjectivity, the Weighted Sum Model offers transparency and provides Pampered Pets with much-needed flexibility in its risk assessment approach (IAPM, N.D.).

# **System Characterisation**

## **Current System Characteristics**

Pampered Pets is a brick-and-mortar business with minimal staff. Most of its business is conducted face-to-face. A small percentage of its client base emails their orders and then travels to the store to pay. The business uses a spreadsheet package on a dated computer to keep track of deliveries. The front desk tracks all sales and purchases on a separate computer.

Although this approach has minimised their potential customer base, the small digital footprint has minimised their risk of a data breach. However, the business must take care of its dated IT because a system that is no longer supported has an increased risk of exploitation (NCSC, 2019). Furthermore, the lack of data protection policies and encryption will mean the business fails to comply with security standards such as ISO 27001 and UK GDPR (Calder, 2024; ICO, N.D.).

## **Future System Characteristics**

Pampered Pets will create an online presence using a cloud broker. It will also use an international supply chain and automated warehouses. Figure Two below illustrates this proposed expansion and the business’ intention to expand its global reach.

A diagram of a trucking process

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*Figure Two (Above): Pampered Pets’ Future Characteristics*

This allows Pampered Pets to expand its reach globally, moving away from small local deliveries and its limited customer base. However, these changes will bring about new risks to the business, and the next section will detail these.

# **Risk Statement**

Figure Three below shows the enumerated supply chain risks. These can be divided into internal and external categories (Olson, 2020).

*Figure Three (Above): Internal vs External Supply Chain Risks.*

The importance of addressing these risks cannot be overstated. Failure to mitigate or terminate such threats as IS breakdown or inaccurate forecasting will result in Pampered Pets failing to meet its fundamental objectives of minimising quality loss and maximising supply chain security. Furthermore, should a security breach occur, and the business fails to comply with the GDPR directive, Pampered Pets will face significant legal fines, and its reputation as a trusted business will be irreversibly harmed.

Having enumerated the risks, they can now be assessed as per the Risk Assessment Approach section.

# **Risk Assessment Results**

## **MCDA Approach**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Risk | Quality | Security | Likelihood | Cost | TWS |
| Inaccurate forecasting | 4 | 2 | 3 | 4 | 3.2 |
| Structural Capacity | 4 | 3 | 4 | 4 | 3.7 |
| IS breakdown | 2 | 5 | 4 | 2 | 3.3 |
| Natural Disasters | 3 | 3 | 2 | 2 | 2.6 |
| Customs and Regulations | 3 | 4 | 4 | 3 | 3.8 |
| Demand Volatility | 5 | 2 | 3 | 4 | 4.4 |
| New technologies | 3 | 4 | 5 | 3 | 3.7 |

The results of assessing the enumerated risks against the business criteria are given below in Table One.

*Table One (Above): Enumerated risks vs business criteria.*

The scores detailed in Table One have been estimated using careful analysis and comparison against business criteria and the demands of the two high-profile customers.

It provides the following hierarchy of risks in terms of their impact on the quality and security of the business, allowing Pampered Pets to focus its efforts where it feels it most needs them. Demand Volatility is the largest risk of those enumerated, with the larger customer base proving to be unknown ground for Pampered Pets.

* Demand Volatility
* Customs and Regulations
* Structural Capacity and New Technologies
* IS Breakdown
* Inaccurate Forecasting
* Natural Disasters

## **Estimating Quality Loss and Supply Chain Security**

In Tables Two and Three, both factors are to be estimated using Bayes’ Theorem. The desired value is in column four of both tables.

|  |  |  |  |
| --- | --- | --- | --- |
| ***P(Q)*** | ***P(I)*** | ***P(I|Q)*** | ***P(Q|I)*** |
| 76% | 50% | 6.3% | 9.6% |

*Table Two (Above). Estimating quality loss with Bayes’ Theorem*

* P(Q): The probability of quality loss is estimated to be 76% by Che et al. (2023).
* P(I): The probability of using an international supply chain. Set to 50%, assuming Pampered Pets maintains a 50/50 split of international versus local deliveries.
* P(I|Q): The probability of an international supply chain given quality loss. This is based on product recalls across Europe (Sedgwick, 2023).

To estimate the security of the supply chain, the same logic will be applied:

|  |  |  |  |
| --- | --- | --- | --- |
| ***P(B)*** | ***P(I)*** | ***P(I|B)*** | ***P(B|I)*** |
| 43% | 50% | 15% | 12.9% |

*Table Three (Above): Estimating security with Bayes’ Theorem*

* P(B): The probability of a security breach. According to Crest’s (2024) estimation, 43% of breaches happen to SMEs such as Pampered Pets.
* P(I): The probability of using an international supply chain.
* P(I|B): The probability of using an international supply chain given a security breach, based on the fact that 15% of companies identified their supply chain as the source of a security breach (Bonnie, 2023).

With the risks assessed and the probability of quality loss and security breaches estimated, the next section will focus on the mitigations Pampered Pets may implement.

# **Mitigations**

Pampered Pets' two fundamental objectives are minimising quality loss and maximising supply chain security. Olson (2020) recommends achieving this through a series of means objectives detailed in Figure Four (below).

*Figure Four (Above): Fundamental and means objectives.*

Thoroughly vetting suppliers and conducting audits on their supply chains should minimise quality loss and maximise supply chain security. This can be achieved by following the guidelines outlined in ISO 19011, particularly ISO 9001, when providing quality services (Sepang, 2025). By choosing to discount the firms with the lowest product quality, this will lower the probability of quality loss to 3% (P(Q|I) = (0.063 \* 0.26) / 0.8 = 3.3). This statistic can still be lowered, depending on Pampered Pets' appetite to restrict their suppliers.

Adopting a robust risk management framework, such as NIST's, is recommended to lower the probability of a supply chain security breach. Whilst there is no quantitative data to support this recommendation, a framework will provide the necessary measures and milestones for Pampered Pets to measure their own supply chain security. By utilising NIST SP 800-161, Pampered Pets can identify, assess, and mitigate cybersecurity risks in the supply chain (NIST, 2024).

# **Business Continuity Plan**

A further requirement for Pampered Pets is to adopt a business continuity/ disaster recovery plan to ensure a constant online presence should a natural disaster affect the shop premises. The online shop must be available 24/7/365, with less than a one-minute changeover window should DR be invoked. Furthermore, the business cannot afford to lose more than one minute of data, and vendor lock-in needs to be minimised.

Pampered Pets should take advantage of the proposed cloud solution, using a potential disaster recovery as a solution (DRaaS). The suggested example would be to use a “Blue Green” deployment model, where two cloned virtualised environments are used (Krief, 2022). The Green deployment is the production model; the blue is the cloned or pre-production model, shown in Figure Five below.

A diagram of a cloud

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*Figure Five (Above): A Blue-Green Deployment Model*

Whilst a single-supplier model will be more cost-effective in meeting the business’s requirements, a multi-supplier model is recommended. The design may be more complex and expensive; however, it will ensure resilience and prevent vendor lock-in, as per requirements.

# **Summary**

Pampered Pets is embracing digital transformation. It will use a cloud broker to provide an online presence and manage its inventory. Further additions include an international supply chain and automated warehouses. Although this will dramatically expand their business, high-profile customers are concerned with the risk of quality loss and supply chain security.

These were assessed to have a 9.6% and 12.9% chance of happening, respectively. To mitigate and lessen these probabilities, Pampered Pets must implement a quality assurance system and regularly audit their third-party suppliers through the guidance detailed in ISO 19011. They must also adopt NIST SP 800-161 to monitor and mitigate supply chain cybersecurity risks.

The final suggestion for Pampered Pets is to adopt a blue-green deployment model for a business continuity/disaster recovery solution. This will allow a quick changeover should a natural disaster affect the shop’s premises.

Altogether, the recommendations in this document should ensure that Pampered Pets minimises their quality loss, maximises the strength of their supply chain, and allows a continuous online presence.

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