

ANALISIS RISIKO (RISK ANALYSIS)

Dalam Bidang Peternakan dan Kedokteran Hewan

Oleh:

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2019



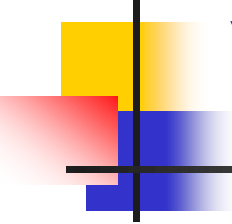
Latar Belakang

- Globalisasi perdagangan dan standar internasional
- April 1994: Kesepakatan akhir “putaran Uruguay” dari negosiasi perdagangan multilateral tentang GATT (General Agreement on Tariffs and Trade) ditandatangani
- Januari 1995: didirikan WTO (90% perdagangan dunia dan 147 negara anggota)



Tujuan WTO

- More free and safer trade by reduction of tariffs (taxes) and Reduction of 'non-tariff barriers' (Animal Diseases, Sanitary Controls)



"Trade barrier"



SPS, TBT

Food Safety

Hygiene & Sanitation

GMOs

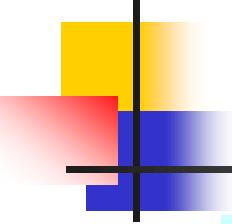
Rule of Origin

WTO

Animal Welfare

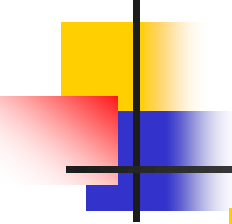
Anti-Dumping

Environment
Human Right



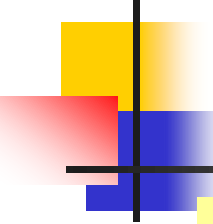
Lanjt...

- Diantara perjanjian-perjanjian (agreements) yang disepakati di WTO adalah **PENERAPAN** dari **SPSS** (Sanitary and Phytosanitary Measures) **Agreement** dan **TBT** (Technical Barriers to Trade) **Agreement**
- SPS: memfasilitasi perdagangan sekaligus menjaga kesehatan manusia, hewan dan tumbuhan



Lanjt...

- TBT: menjamin kesesuaian aturan teknis, standar-standar, termasuk didalamnya syarat-syarat pengemasan, penandaan dan pelabelan dan prosedur analisis dengan aturan-aturan teknis dan standar (internasional) tidak menjadi halangan atau masalah dalam perdagangan.



Perjanjian SPS pasal 5 ayat 1

“Members shall ensure that their **sanitary or phytosanitary measures** are based on an **risk assessment**, as appropriate to the circumstances, of the risks to human, animal or plant life or health, taking into account **risk assessment techniques developed by the relevant international organizations.**“

Pasal 2, Ayat 2 SPS Agreement menyatakan:

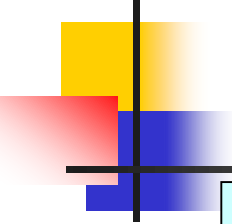
"Members shall ensure that any sanitary and phytosanitary measure is applied only to the extent necessary to protect human, animal or plant life or health, **is based on scientific principles and is not maintained without sufficient scientific evidence ...**"

Pasal 3, Ayat 1 SPS Agreement menyatakan:

"To harmonize sanitary and phytosanitary measures on as wide a basis as possible, Members shall base their sanitary and phytosanitary measures on **international standards, guidelines or recommendations, where they exist, except as otherwise provided for in this Agreement.**"

- **Pasal 2, Ayat 6 TBT Agreement menyatakan:**

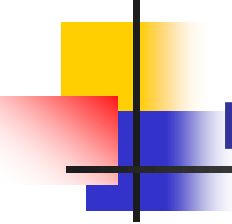
"With a view to harmonizing technical regulations on as wide a basis as possible, Members shall play a full part, within the limits of their resources, in the preparation by appropriate international standardizing bodies of international standards for products for which they have either adopted, or expect to adopt, technical regulations."



CODEX CODE OF ETHICS FOR INTERNATIONAL TRADE IN FOOD

General Principles

- **4.1** International trade in food should be conducted on the principle that all consumers are entitled to safe, sound and wholesome food and to protection from unfair trade practices.
- **4.2** No food should be in international trade which:
 - (a) has in it or upon it any substance in an amount which renders it poisonous, harmful or otherwise injurious to health; or
 - (b) consists in whole or in part of any filthy, putrid, rotten, decomposed or diseased substance or foreign matter, or is otherwise unfit for human consumption; or
 - (c) is adulterated; or
 - (d) is labelled, or presented in a manner that is false, misleading or is deceptive; or
 - (e) is sold, prepared, packaged, stored or transported for sale under insanitary conditions.



International standards, guidelines and recommendations

- a) For **food safety**, established by the Codex Alimentarius Commission (CODEX)
- b) For **animal health and zoonoses**, developed under the auspices of the International Office of Epizootics (OIE)
- c) For **plant health**, developed under the auspices of the secretariat of the International Plant Protection Convention (IPPC)
- d) For **matters not covered by the above organization**, establish by other relevant international organizations, such as International Organization for Standardization (ISO)



Sejarah dan Definisi Risiko 1

- Pandangan tradisional: zero risk (tanpa risiko); mungkinkah???
- **Risiko yang dihadapi oleh manusia sehari-hari:**
 - *motor vehicle accident (all)* $2.4 * 10^{-4}$
 - *motor vehicle accident (pedestrian)* $4.2 * 10^{-5}$
 - *home accidents* $1.1 * 10^{-4}$
 - *cigarette smoking* $3.6 * 10^{-3}$
 - *alcohol (moderate)* $2.0 * 10^{-5}$



Sejarah dan Definisi Risiko 2

Konsep “acceptable risk” (risiko yang dapat diterima)

- Berdasarkan penerimaan dari beberapa risiko
- Level dan penerimaan risiko memerlukan perjanjian/agreement oleh semua yang terlibat oleh risiko tsb.
- “Assessment” (kajian) dari suatu risiko melalui suatu metodologi yang disetujui oleh semua pihak terkait



Risk (risiko) vs Safety (keamanan) pertimbangkan:

- **Nutritious –vs-tasty**
- **# 1 rated car –vs-a good car**
- **A contract –vs-agreement**
- **The weather –vs-a bad day**

Risk is measurable, objective, and based on fixed criteria
(Risiko itu dapat diukur, objektif dan berdasarkan kriteria yang tetap)



Apa Itu Risiko?

Risiko VS Ketidakpastian (Uncertainty)

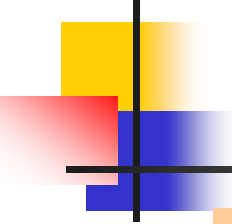
- **RISK** (Last, 1988):

"The probability that an event will occur; the event usually is an unfavourable outcome"

- **UNCERTAINTY** (Vose, 2000):

"The assessor's lack of knowledge (level of ignorance) about the parameters that characterise the physical system that is being modelled".

- indeterminability" (= total uncertainty)



Elemen-elemen Risiko

- a choice of action (exposure to loss), either voluntary or involuntary
- a probability (or frequency) of loss
- a magnitude of loss (character, extent, timing), assessments which are not value - free

Risiko yang bersifat menimbulkan suatu bencana terjadi saat peluang terjadinya suatu kasus sangat rendah (extremely low) akan tetapi besaran (magnitude) dari konsekuensi yang mungkin ditimbulkannya sangat besar. Contoh: kasus PMK di negara-negara Eropa Tengah



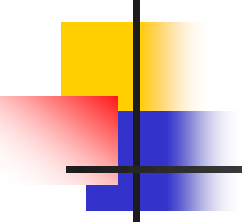
Apa itu RISIKO?

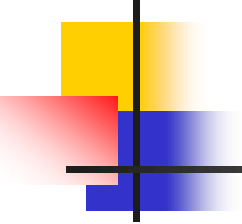
WHO:

- *Risk: The probability that a negative event or condition have to affect an individual in a given time and space*

OIE:

- *Risk: The likelihood of the occurrence and the likely magnitude of the consequences of an adverse event to animal or human health in the importing country during a specified time period.*
- **Risk= p x m x c;**
probability x magnitude x consequence

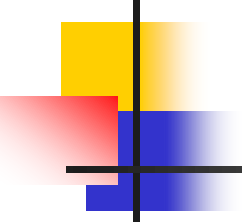
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- **Bahaya (Hazard)** = agen biologis, kimia atau fisik yang terdapat dalam bahan pangan atau kondisi suatu bahan pangan yang memiliki potensi untuk menyebabkan pengaruh yang buruk bagi kesehatan (CODEX)

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- **Risk** is a probability: it can be calculated
 - **Hazard** is a potential: it can be assessed but not ,calculated`
 - A Hazard is a Threat
 - Hazards are **events** (e.g. storm), **biological entities** (e.g. bacteria) or **physical agents** (e.g. heat)
 - SEBUAH RISIKO HANYA DAPAT TERWUJUD JIKA TERDAPAT BAHAYA POTENSIAL (POTENTIAL HAZARDS)



Analisis Risiko (Risk Analysis)?

- Sebuah cara sistematis untuk mengumpulkan, mengevaluasi dan mencatat informasi yang menghasilkan rekomendasi bagi sebuah posisi atau aksi sebagai respon terhadap 'bahaya' yang telah teridentifikasi
- CODEX: Sebuah proses yang terdiri atas serangkaian aktivitas yaitu identifikasi bahaya, pengkajian risiko, manajemen risiko dan komunikasi resiko
- *is fundamentally a **science-based process** that strives to reflect the **realities of Nature** in order to provide **useful information** for **decision processing about managing risks***

- 
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- The Office of International Des Epizooties (OIE; didirikan 1924) membuat *Standards on **Good Quality Disease Surveillance, Risk Analysis and the level of scientific proof on disease status.***
 - “OIE Codes”: Pembuktian KETIDAKADAAN (Absence) dari suatu BAHAYA (Hazard) harus DAPAT DIHITUNG (**QUANTIFIABLE**) yang membutuhkan estimasi peluang (**probability estimates**) yang akan banyak digunakan dalam **science-based Risk Analysis (RA)**



Risk Analysis

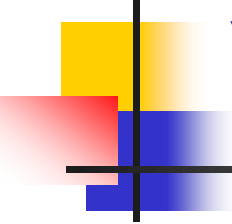
Sebuah proses yang terdiri atas tiga komponen berbeda namun saling berhubungan:

- "Risk assessment"
- "Risk management"
- "Risk communication"



I. Risk Assessment (Pengkajian Risiko)

- *The qualitative or quantitative estimation of the likelihood of adverse effects that may result from exposure to specific health hazards or from the absence of beneficial influences*
- Terdiri atas 2 tahap yang sistematis:
 1. Risk determination (identification and estimation)
 2. Risk Evaluation



“Health Risk Assessment”

- *a specific process to estimate the likelihood that humans, animals or ecological systems will be affected adversely by a chemical or physical agent under a specific set of conditions.*
- Tahapan “Health Risk Assessment”
 1. Hazard identification
 2. Hazard characterization
 3. Exposure characterization
 4. Risk characterization



II. Risk Management (Manajemen Risiko)

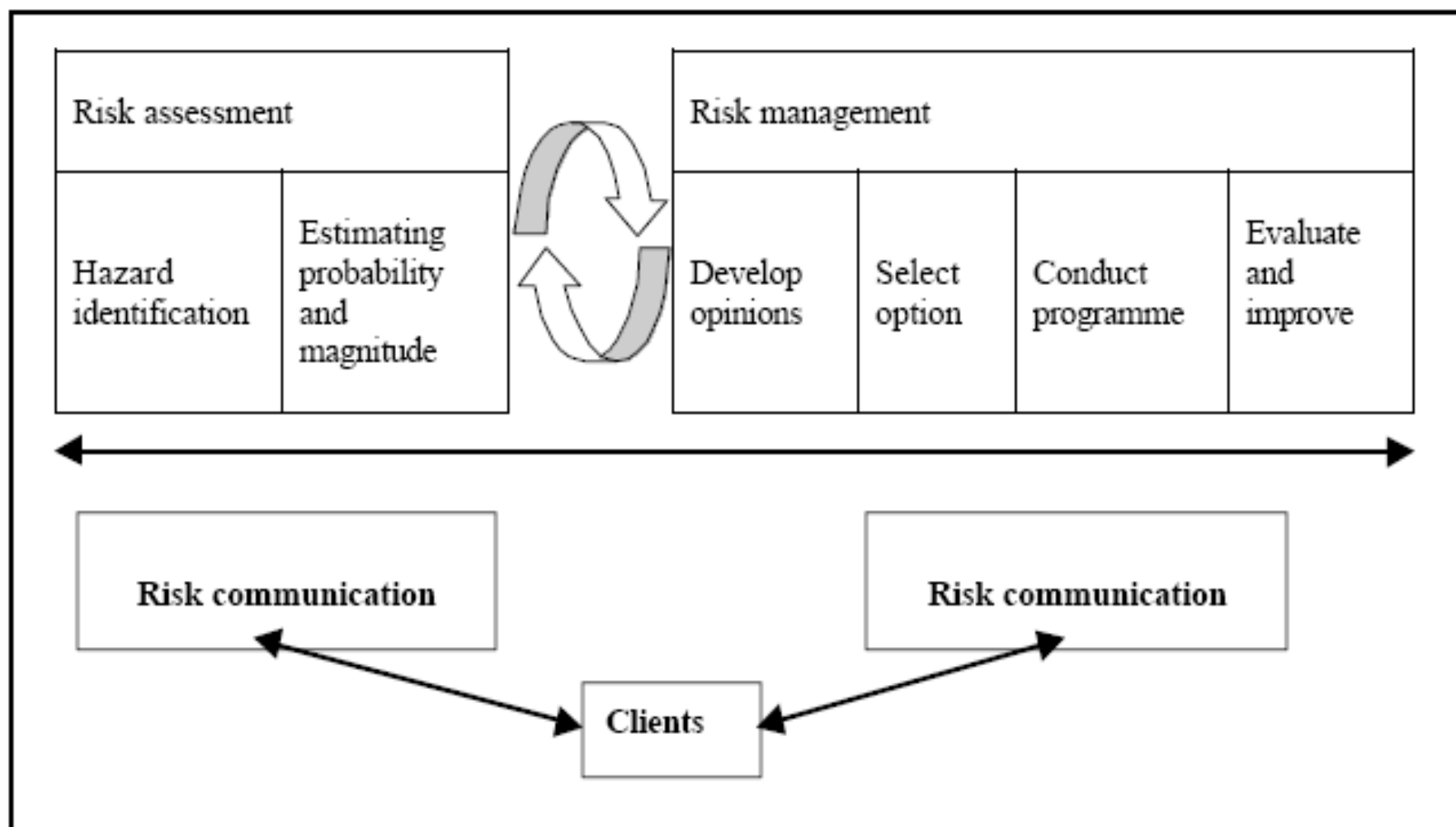
- = the process where (usually) a regulatory agency decides what to do about the results of risk assessment, and implements this decision
- However, as economic, social and political considerations will influence the setting of the priorities, the design of the regulations could well be suboptimal in scientific and technical terms.



III. Risk Communication (Komunikasi Risiko)

- Communicating the results to interested parties and decision makers is the final step to complete a risk assessment. This certainly includes proposing effective controls to monitor the selected actions.

Figure: The components of risk analysis (OIE Scientific and Technical Review Vol 1, 1993)





Terrestrial Animal Health Code 2003

Section 1.3

IMPORT RISK ANALYSIS

Chapter 1.3.1. General considerations

Chapter 1.3.2. Guidelines for risk analysis

Chapter 1.3.3. Evaluation of Veterinary Services

**Chapter 1.3.4. Guidelines for the evaluation of
Veterinary Services**

Chapter 1.3.5. Zoning and regionalisation

**Chapter 1.3.6. Surveillance and monitoring of animal
health**

**Chapter 1.3.7. Guidelines for reaching a judgement of
equivalence of sanitary measures**

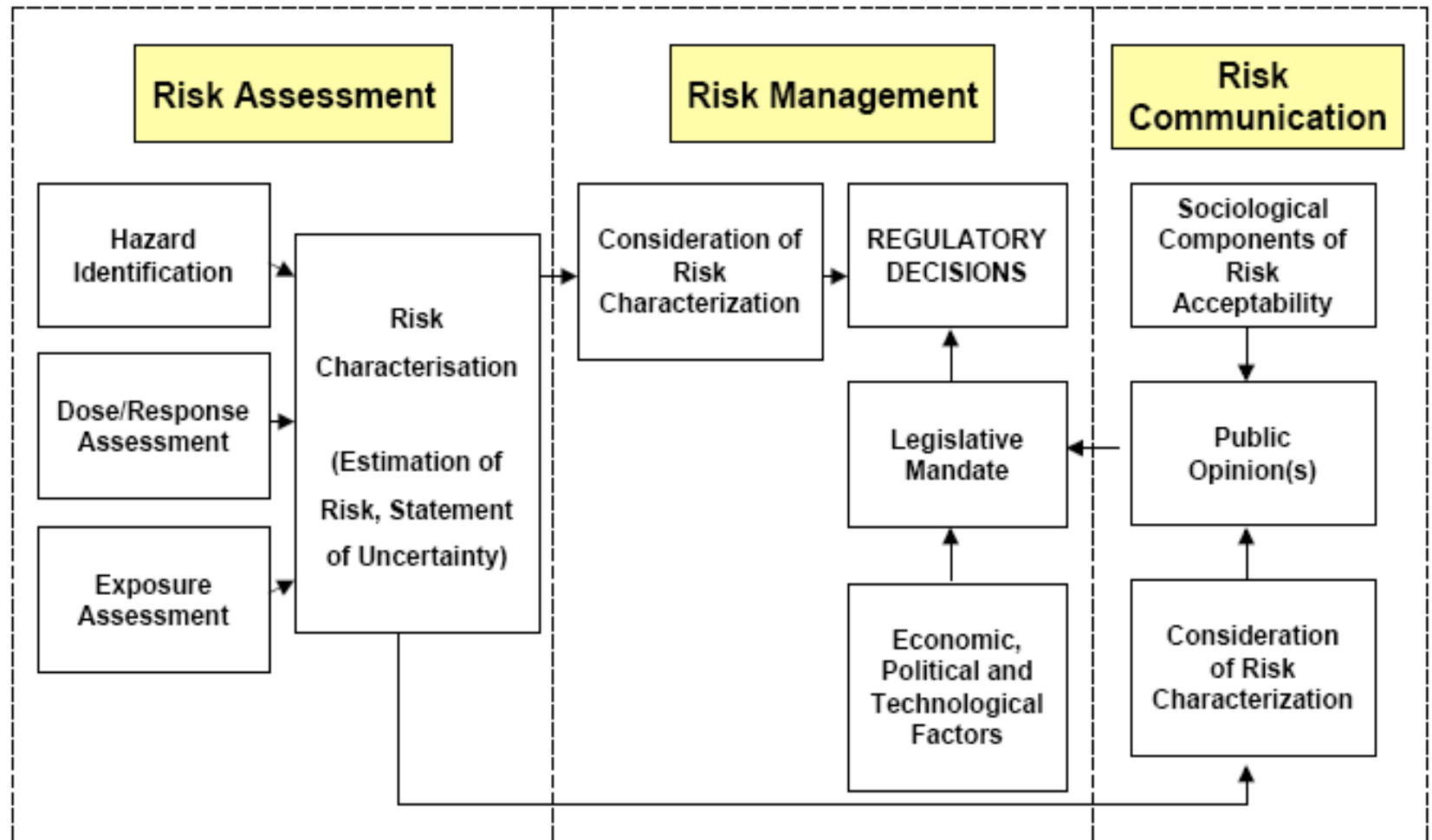


Aplikasi Pengkajian Risiko

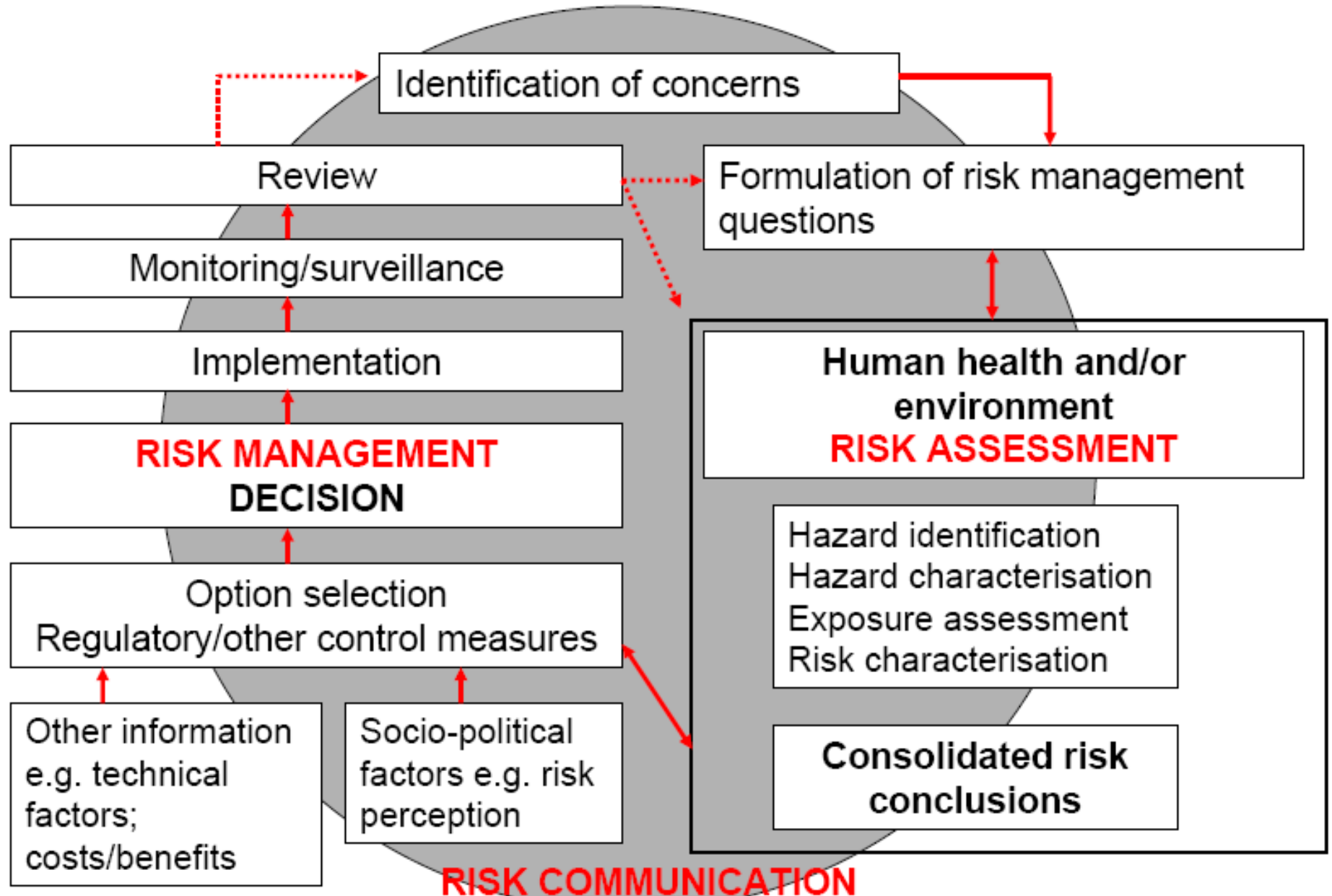
risk assessment applicable in three main areas:

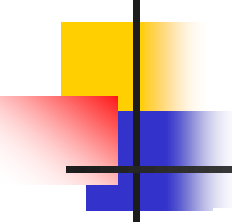
- international trade in animals and animal products
- food hygiene
- veterinary biologicals

Tahapan Analisis Risiko

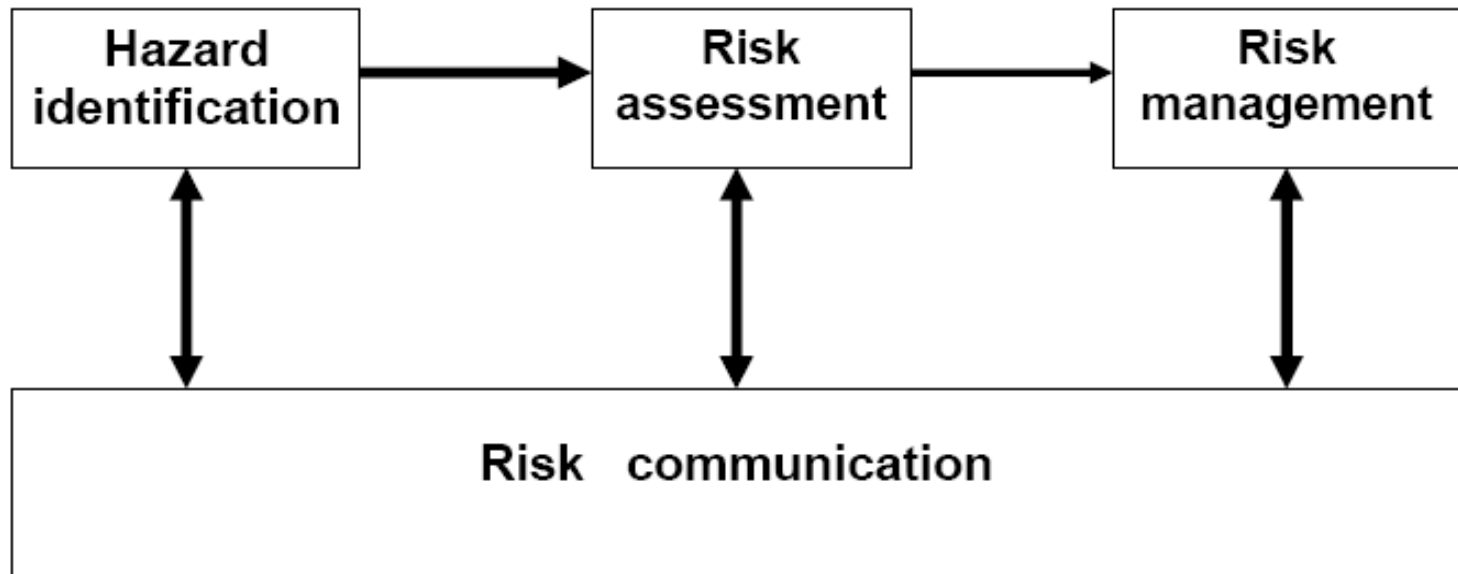


The “RISK CYCLE” (components of risk analysis)





4 Komponen Analisis Risiko Menurut OIE

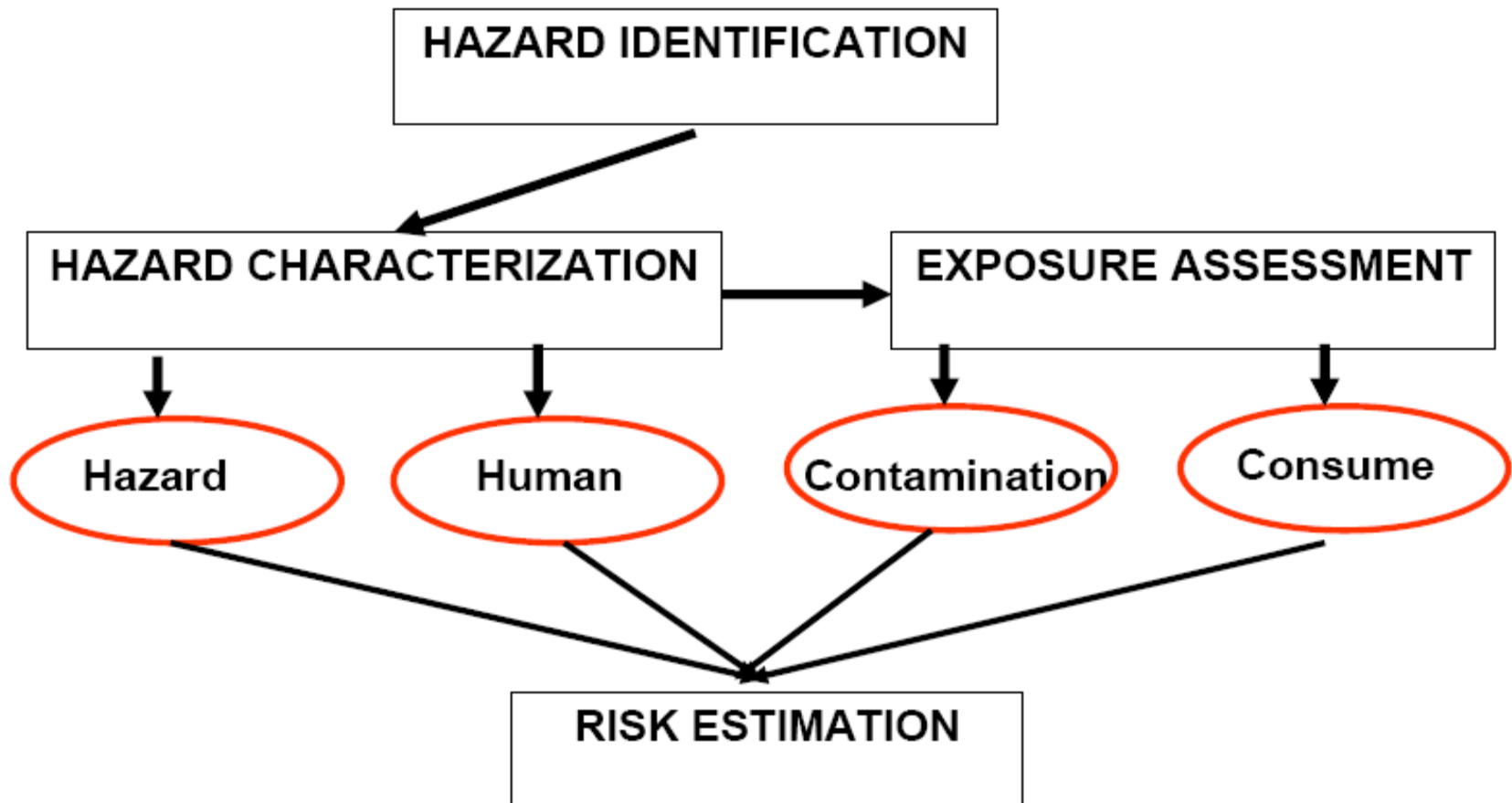




Perbedaan Analisis Risiko: OIE vs FAO/WHO (Codex)

	OIE	FAO/WHO
Hazard Identification		-
Risk Assessment	▪ Release assessment ▪ Exposure assessment ▪ Consequence assessment	■ Hazard identification ■ Hazard characterization ■ Exposure assessment ■ Risk estimation
Risk Management		Risk Management
Risk Communication		Risk Communication

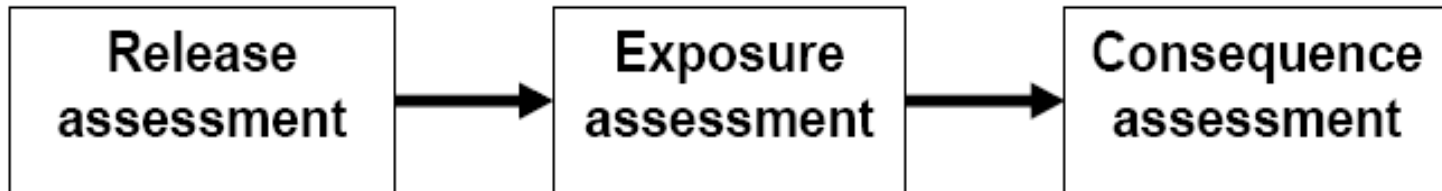
4 Komponen "Risk Assessment" menurut FAO/WHO





4 Komponen “Risk Assessment” menurut OIE

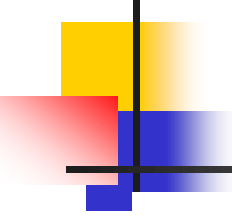
Risk Estimation





Skenario dari “Import Risk Analysis”



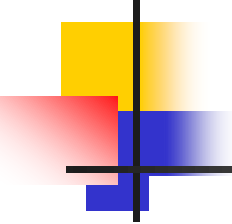


1. *Hazard Identification*



Faktor-faktor:

- Perbedaan prevalensi infeksi (risk potential)
- Keberadaan *susceptible population* (hewan, vektor, reservoir)

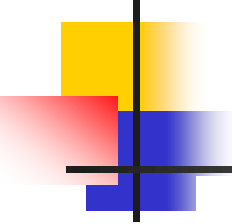


2. *Release Assessment*



Faktor-faktor:

- Situasi epidemiologis di "export country", pengendalian penyakit hewan
- Volume ekspor, multiplikasi agen penyakit

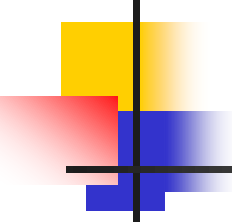


3. *Exposure Assessment*



Faktor-faktor:

- Karakteristik agen, vektor
- Jalur/tahapan dari paparan (exposure) dan disposisi
- Paparan resiko terhadap populasi



4. *Consequence Assessment*



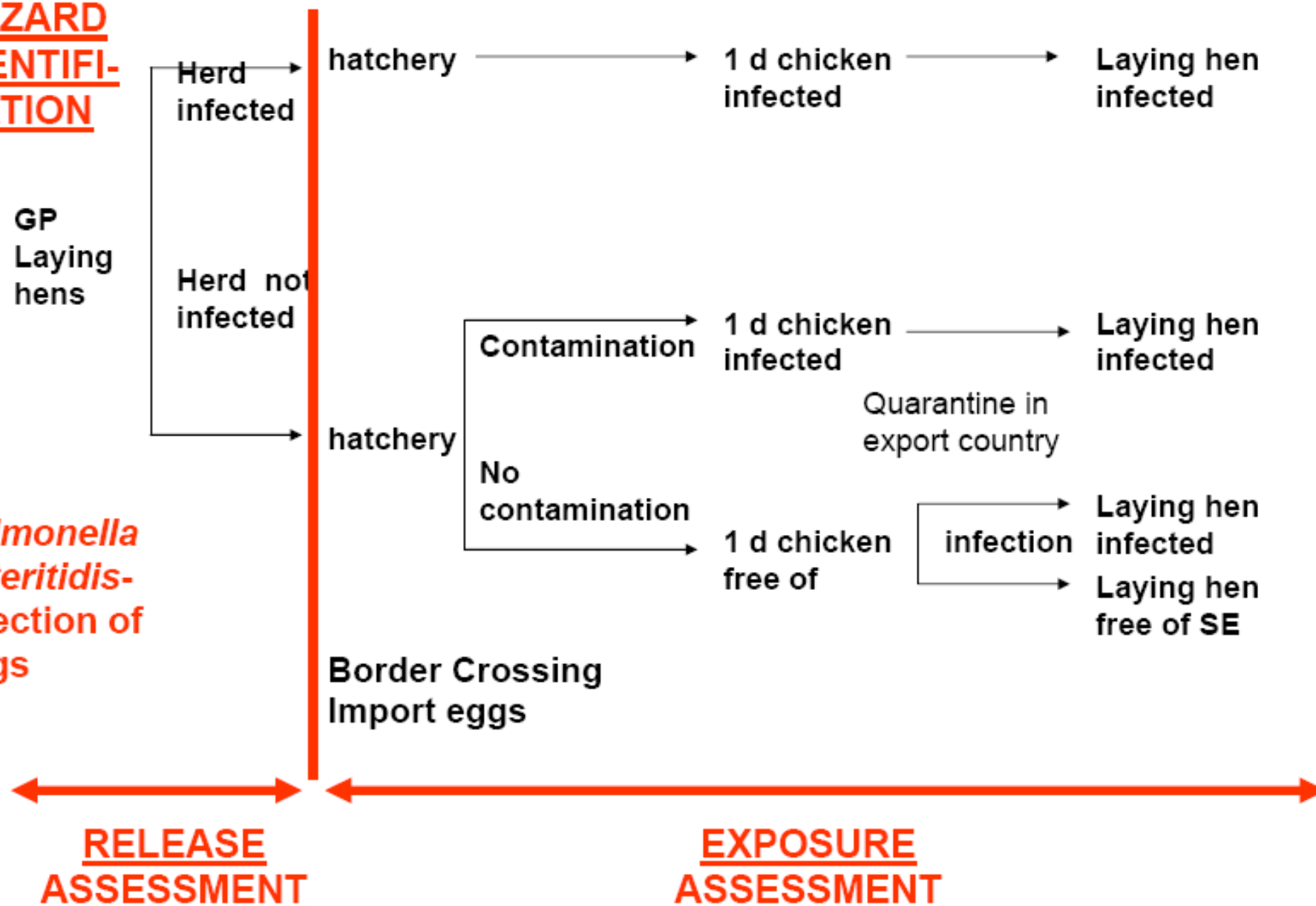
Faktor-faktor:

- Laju penyebaran dan infeksi, patokan/ukuran pengendalian
- Kehilangan/kerugian langsung, biaya pengendalian
- Biaya tindak lanjut secara sosial dan ekonomi, biaya lingkungan

RELEASE/EXPOSURE ASSESSMENT (1)

HAZARD IDENTIFICATION

GP Laying hens
Salmonella enteritidis-Infection of eggs

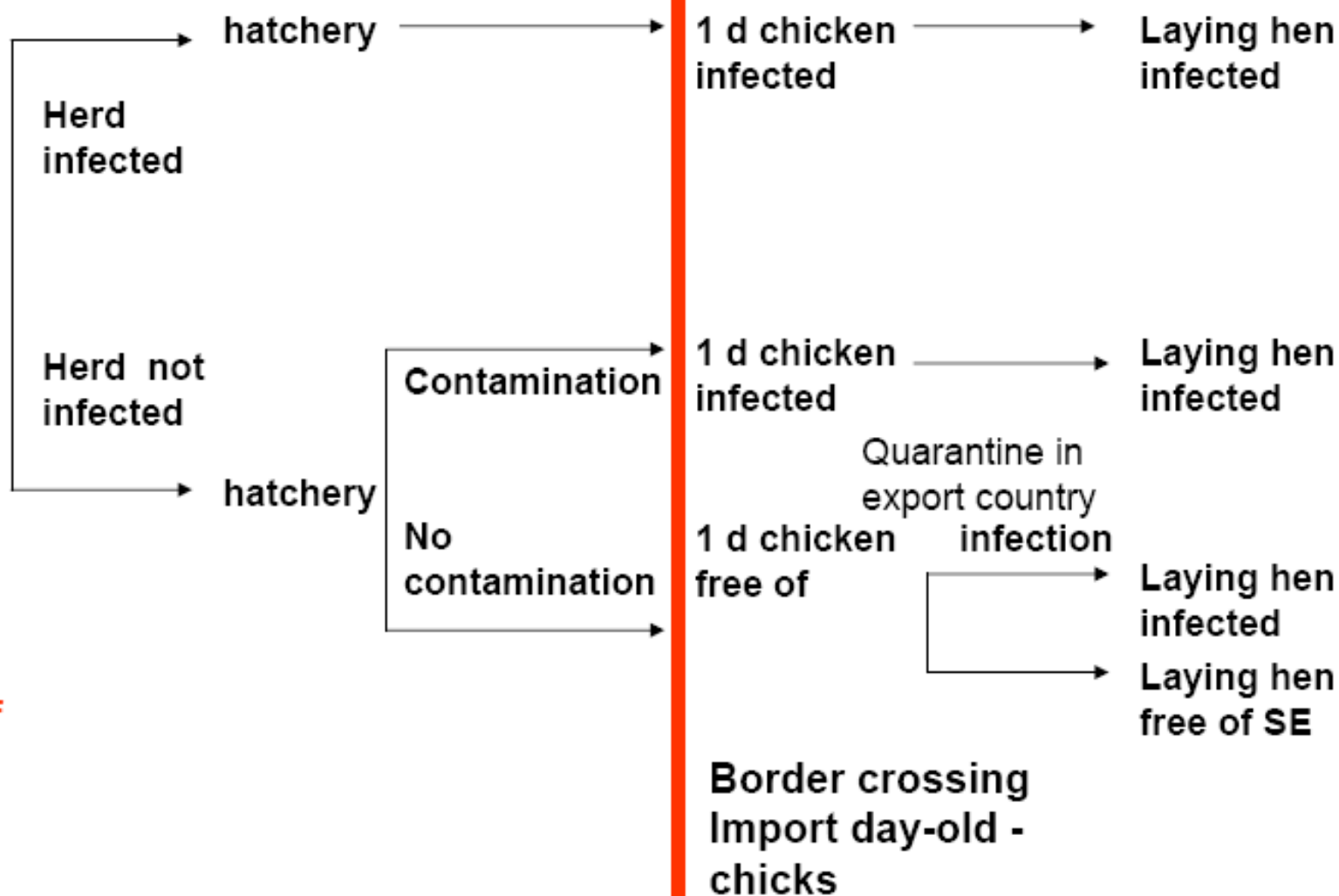


RELEASE/EXPOSURE ASSESSMENT (2)

HAZARD IDENTIFICATION

GP Laying hens

Salmonella enteritidis-Infection of chicks



RELEASE
ASSESSMENT

EXPOSURE
ASSESSMENT

**Release
assessment**

Biological factors: (epidemiology): species, age, breed, predilection sites, vaccination, testing, quarantine

Country factors: prevalence, incidence, evaluation of veterinary services, surveillance, control programs

Commodity factors: volume to be imported, ease of contamination, effect of processing, effect of storage and transport

**Exposure
assessment**

Biological factors: properties of the agent

Country factors: presence of potential vectors, human&animal demographics, customs and cultural practices, geographic & environmental factors

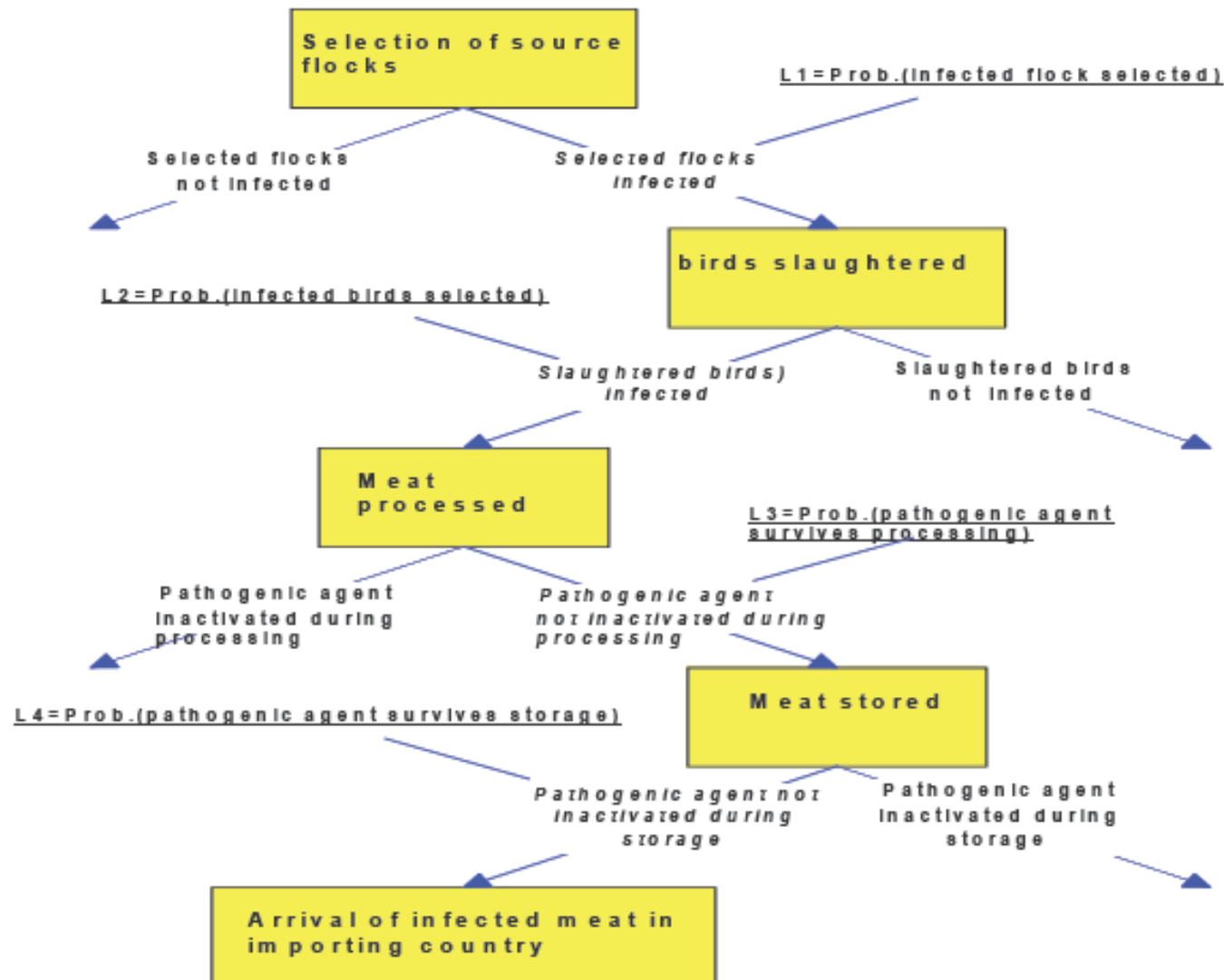
Commodity factors: volume, intended use, disposal practices

**Consequence
assessment**

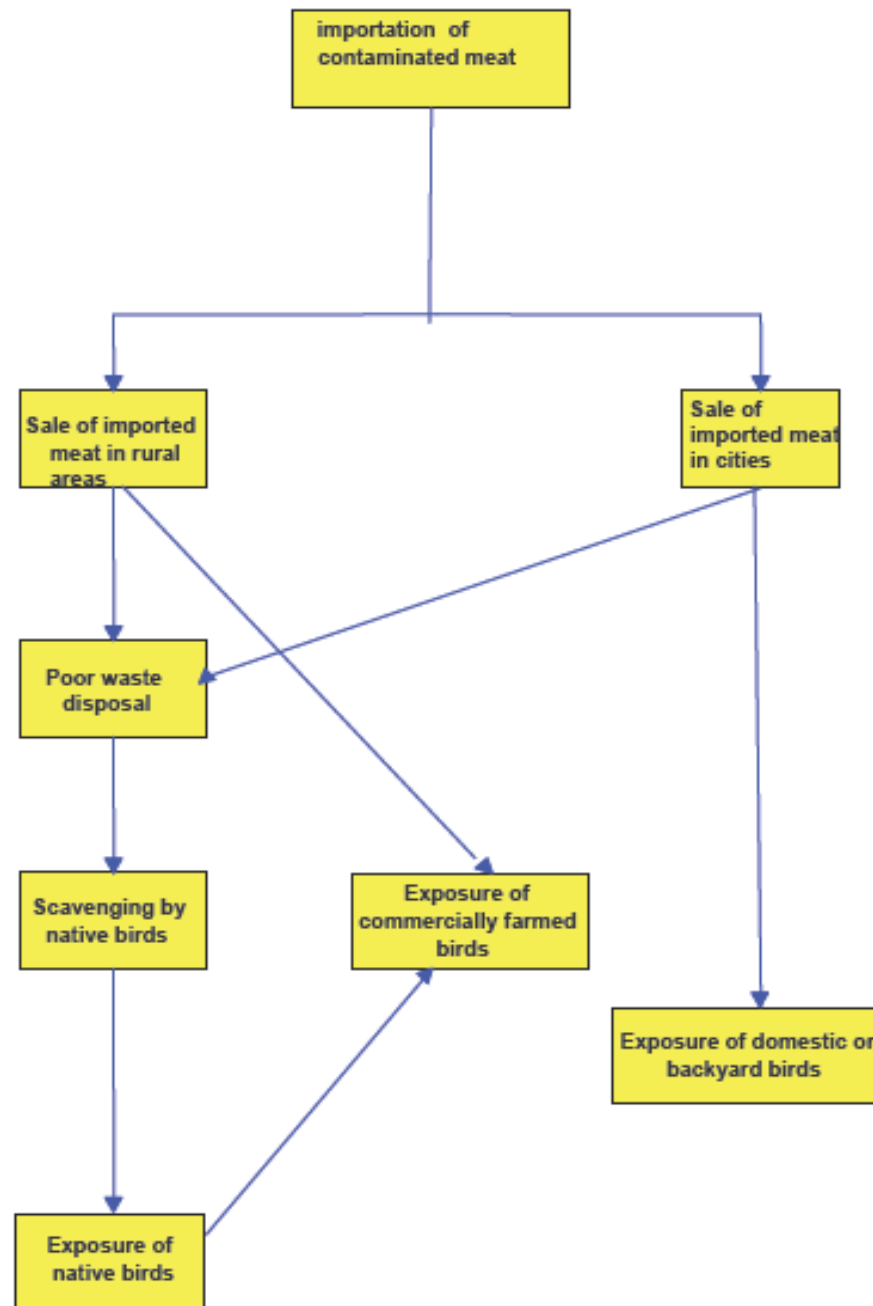
Direct consequences: animal infection, disease, death, production loss, public health consequences

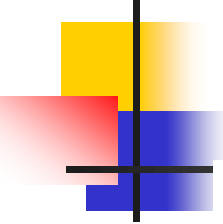
Indirect consequences: surveillance & control costs, compensation costs, trade losses

Import of poultry meat: release scenario



Import of poultry meat: exposure scenarios





Pengkajian Risiko Kualitatif vs Kuantitatif

Increasing in complexity and
required resources

Qualitative risk assessment

= collect data including quantitative data and assess the risk using descriptive terms (e.g. low, negligible, high risk)

Scoping study:

Evaluate the availability of good quality numerical data for quantitative risk assessment

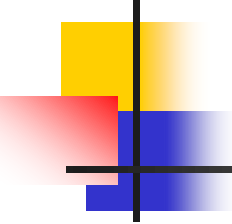


Quantitative risk assessment

= assess the risk numerically (2 methods):

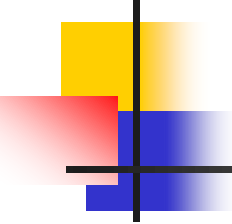
Deterministic

↓
Stochastic



Perbandingan Analisis Risiko Kualitatif dan Kuantitatif

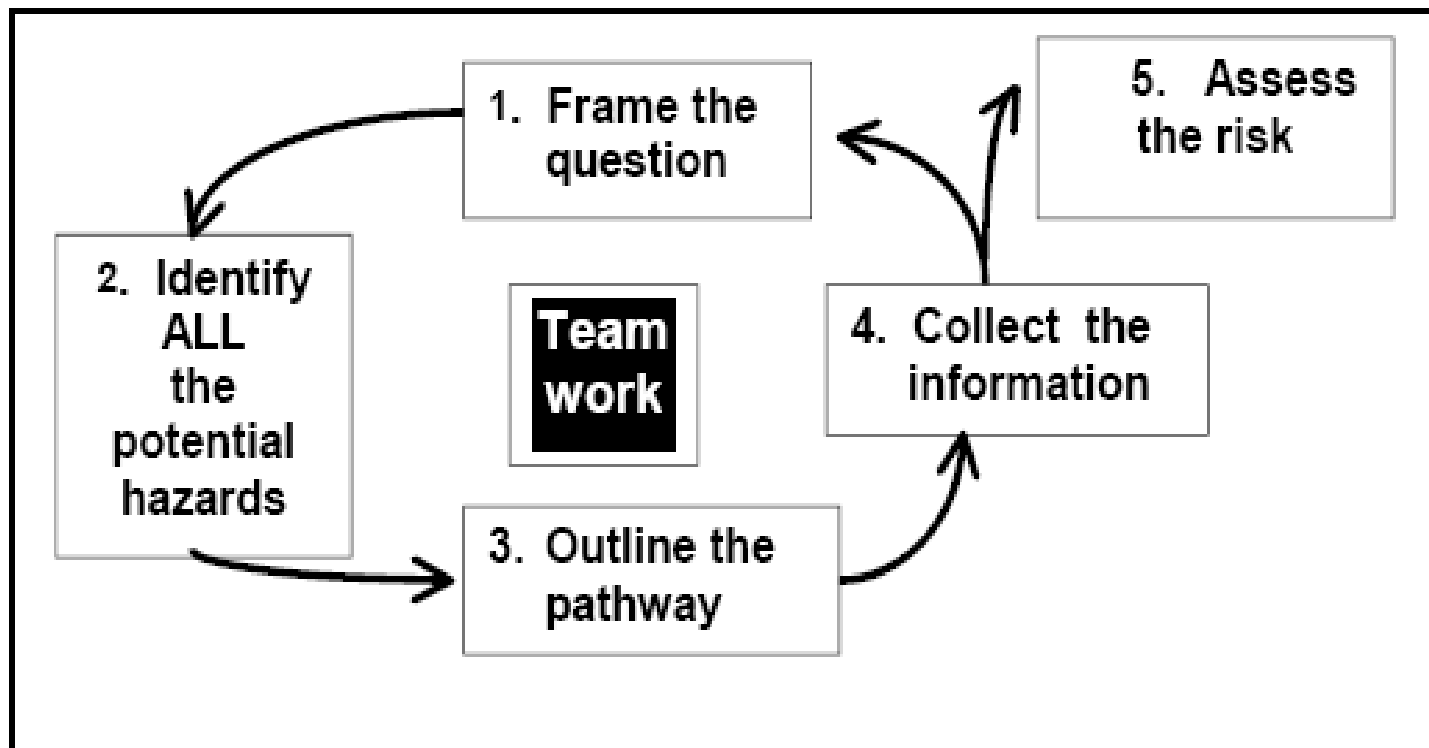
	Kualitatif	Kuantitatif
Output	Kata-kata	Angka
Kelebihan	▪ Relatif mudah untuk dikerjakan ▪ Memerlukan input yg tidak terlalu banyak ▪ Mudah dikomunikasikan	▪ Lebih banyak informasi ▪ Representasi variabilitas (variability) dan ketidakpastian (uncertainty) yang lebih baik
Kekurangan	▪ Tidak dapat menunjukkan “uncertainty” dengan baik ▪ Kurang menampilkan detail ▪ Menyederhanakan (tidak realistis)	▪ Memerlukan data yang banyak ▪ Memerlukan keahlian yang banyak ▪ Lebih sulit dikomunikasikan



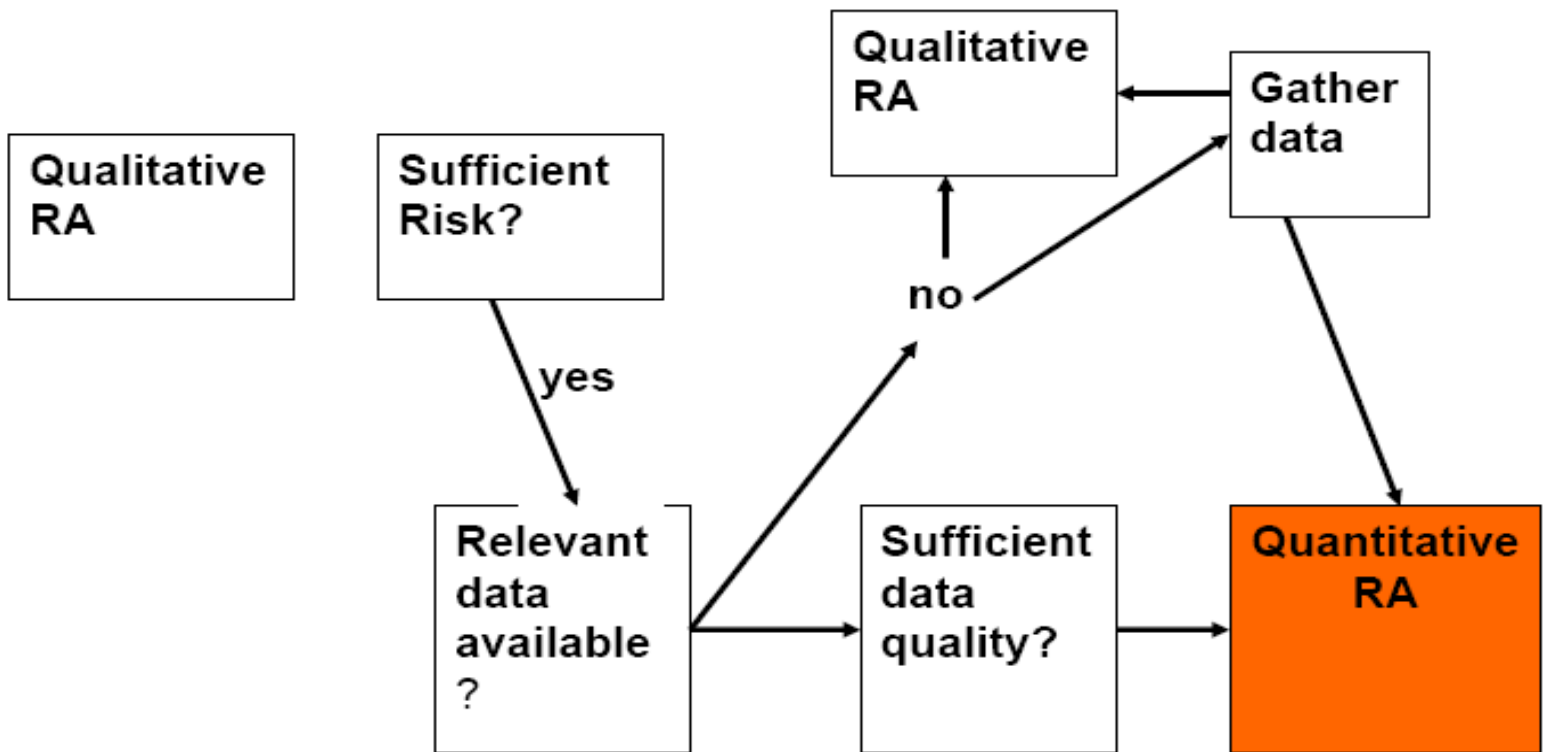
Tahapan-tahapan Utama dari Pengkajian Risiko Kualitatif dan Kuantitatif

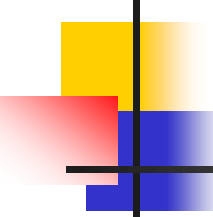
1. Susun pertanyaan yang tepat
2. Identifikasi bahaya (hazard) yang potensial
3. Rancang model tahapan/alur proses (pathway)
4. Pengumpulan informasi yang dibutuhkan
5. Pengkajian resiko

The elements of risk assessment (Woolridge, 2000)



Proses/Tahapan Mengembangkan Analisis Risiko





Interpretasi Pengkajian Risiko Kualitatif dan Kuantitatif

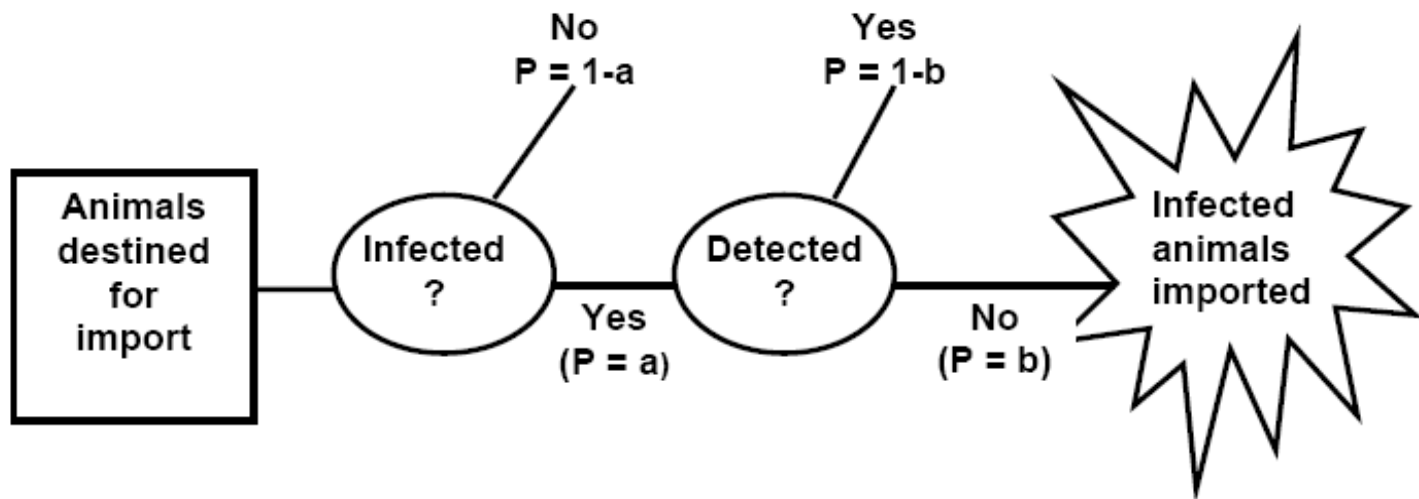
KUALITATIF	INTERPRETASI	KUANTITATIF
Peluang (Probability) dari kejadian adalah		
Dapat diabaikan (neglected)	Kejadian hampir dapat diabaikan	$P < 10^{-6}$
Rendah (low)	Dapat terjadi tapi jarang	$P < 10^{-5}$
Menengah (moderate)	Dapat terjadi kadang-kadang	$P < 10^{-3}$
Tinggi (high)	Sering terjadi	$P > 10^{-6}$

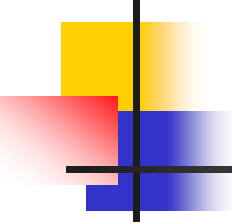
8 Tahap Pengkajian Risiko Kuantitatif (Quantitative Risk Assessment=QRA)

Step1: Define the risk to be assessed

Step2: Identify the hazard or hazards

Step3: Outline the initial model framework





Lanjt.

Step 4: Identify the inputs and acquire the data

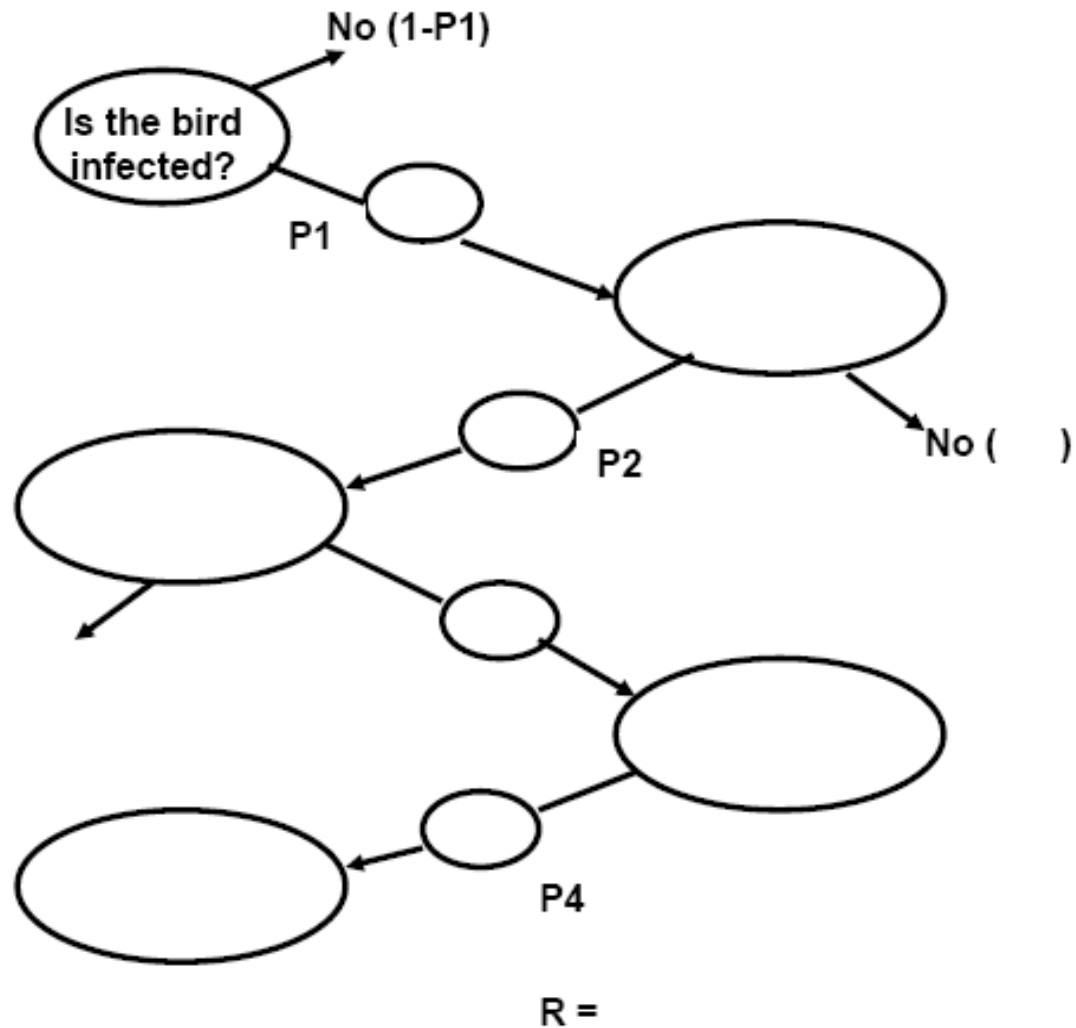
Step 5: Adopt an iterative approach to the model

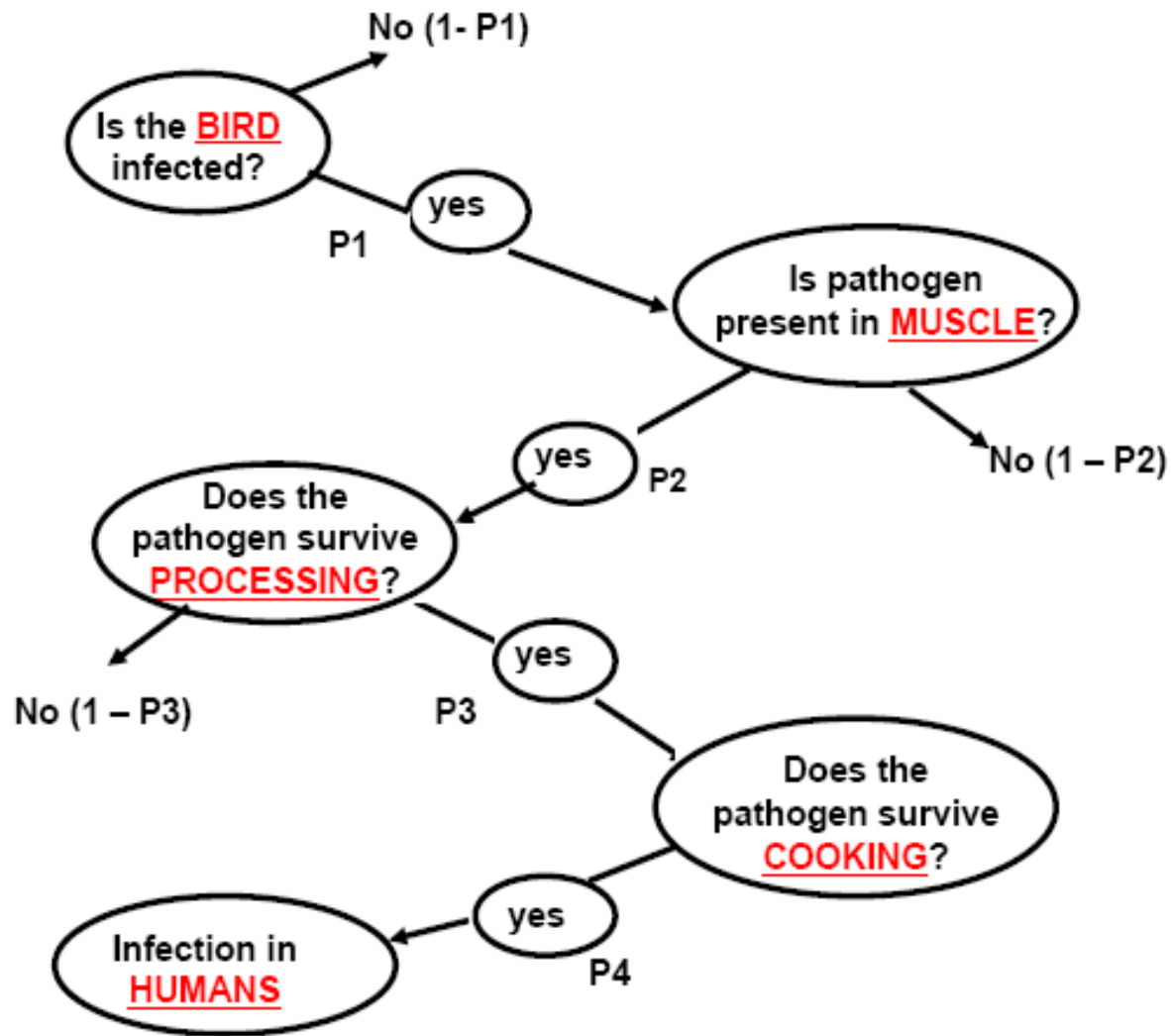
Step 6: Undertake sensitivity testing

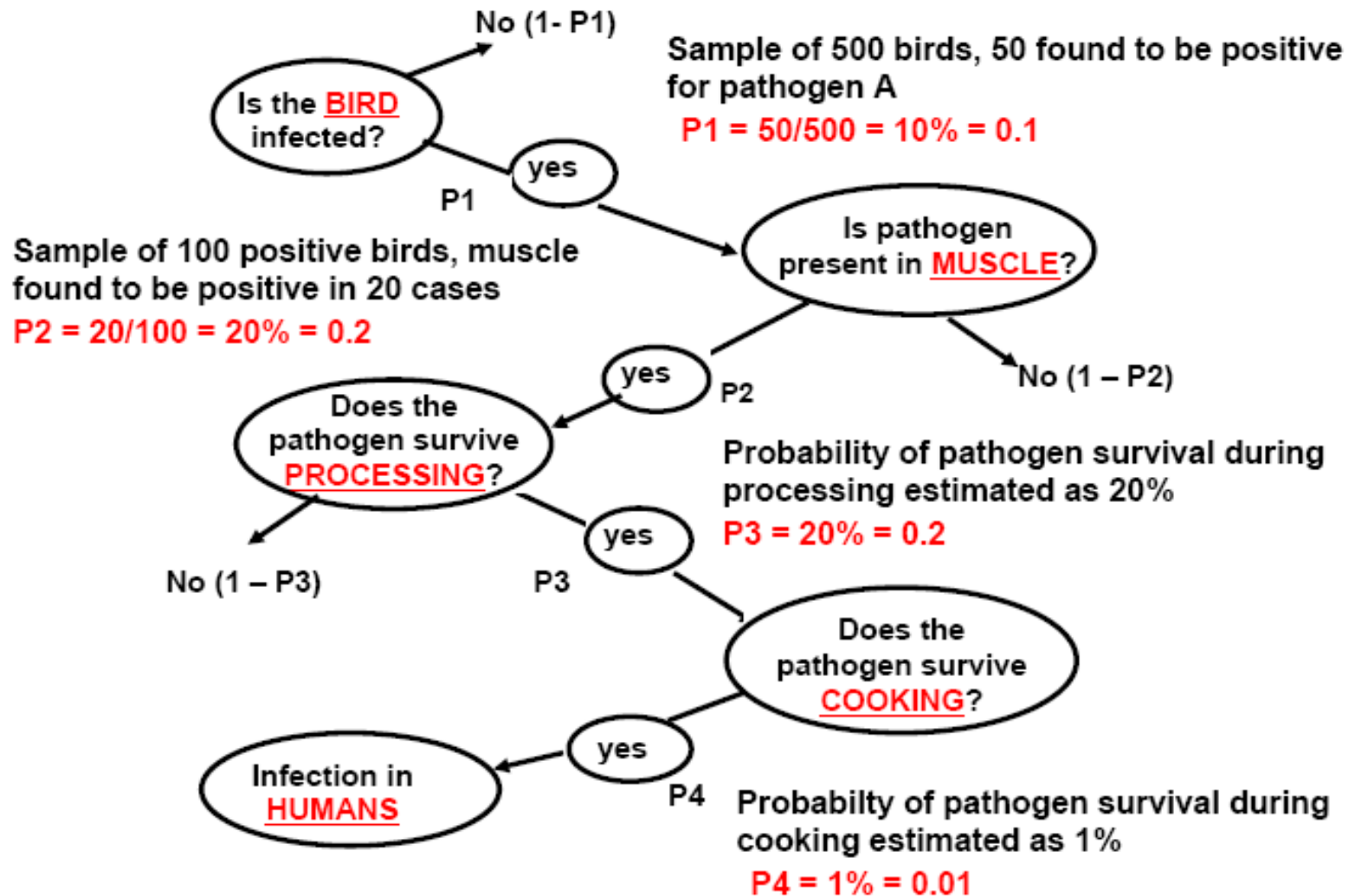
Step 7: Ensure clarity

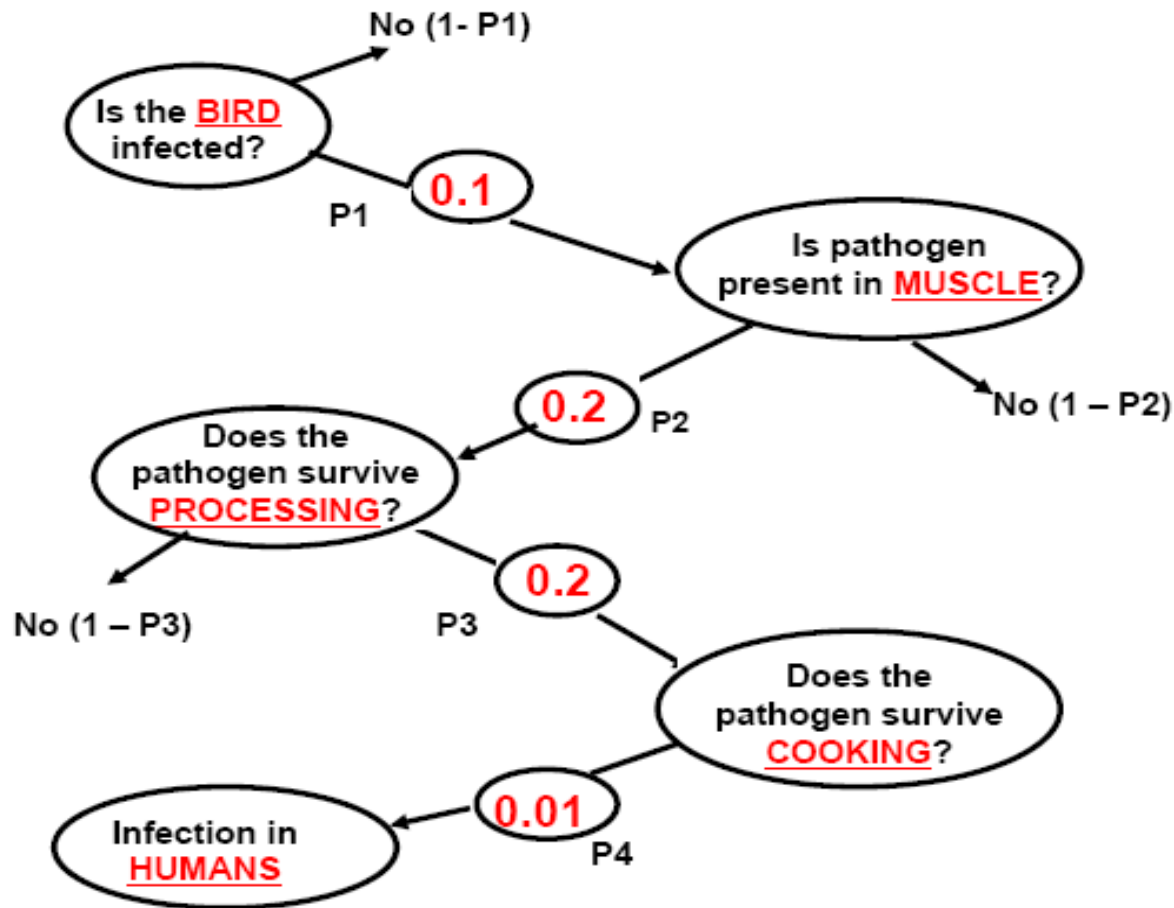
Step 8: Obtain feedback

PATHWAY: CONSUMPTION OF POULTRY MEAT





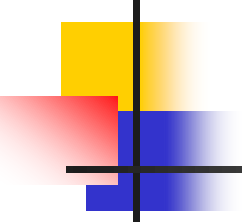




$$R = P1 \times P2 \times P3 \times P4$$

$$R = 0.1 \times 0.2 \times 0.2 \times 0.01$$

$$\underline{R = 0.00004}$$

- 
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- Lanjut ke Laporan OIE dan FAO/APHCA

 - Kualitatif dan kuantitatif RA
 - Latihan membuat pathway/alur
 - serta aplikasi program @risk