

PROJECT AGREEMENT

This Project Agreement is made on the _____ day of _____ 2024
Between

- (1) **NANYANG TECHNOLOGICAL UNIVERSITY (Company Registration Number: 200604393R)**, located at 50 Nanyang Avenue, Singapore 639798, and acting through its [insert name of NTU unit e.g. School of Physical and Mathematical Sciences ("NTU")];

and

- (2) **PANASONIC INDUSTRIAL DEVICES SINGAPORE PTE. LTD.** (Company Registration Number: 202137870G), a company duly incorporated under the laws of Singapore with its registered office address at 3 Bedok South Road, Singapore 469269 ("**Company**").

NOW IT IS HEREBY AGREED as follows:

1. SCOPE

- 1.1. This Project Agreement relating to the Research Project entitled "**Material procurement management optimization for B2B industrial devices**" is supplementary to the Master Agreement dated 21st of February 2023 (including the supplements by its Addendum dated 17th of November 2023, the "**Master Agreement**") and shall be construed and read together with the Master Agreement. The Parties agree that the terms and conditions of the Master Agreement shall, unless otherwise expressly stated herein, apply to and govern this Project Agreement and the rights and obligations of the Parties shall be construed accordingly.
- 1.2. In consideration of the mutual covenants and provisos herein, NTU and the Company undertakes to perform the Research Project in accordance with the Work Plan specified in Schedule 1 to this Project Agreement in accordance with the terms of the Master Agreement and this Project Agreement.
- 1.3. All terms and references used in the Master Agreement and which are defined in the Master Agreement but are not defined in this Project Agreement shall, unless the context otherwise requires, have the same meaning and construction when used in this Project Agreement. In the event of any inconsistency or ambiguity between the terms of the Master Agreement and this Project Agreement, the terms of this Project Agreement shall prevail.

2. DEFINITIONS

The definitions in the Master Agreement are amended.

- 2.1. "**Confidential Information**" means any device, graphics, written information, or information in any other tangible form that is disclosed by the disclosing Party and its Affiliates ("**Discloser**") to the receiving Party ("**Recipient**") and it marked at the time of disclosure as confidential or proprietary or with words of similar import. Information disclosed orally or visually and identified at the time as confidential shall be considered Confidential Information if it has been confirmed and designated in writing as

RESEARCH COLLABORATION AGREEMENT

confidential within thirty (30) days after its disclosure.

3. PRINCIPAL INVESTIGATOR

- 3.1. The Research Project shall be supervised and coordinated by Asst Prof Yan Zhenzhen on behalf of NTU (hereinafter referred to as the "**NTU Principal Investigator**" or "**NTU PI**") and Depdeep Paul on behalf of the Company ("**Company PI**").
- 3.2. If, for any reason, any of the Principal Investigators are unable to continue to serve as Principal Investigator under the Research Project, and a successor acceptable to the Parties is not available, this Agreement may be terminated by any of the Parties and the provisions of Clause 11 of the Master Agreement shall apply.

4. CONTRIBUTIONS

- 4.1. NTU and the Company shall provide the manpower, equipment, funding and other contributions as specified in the Research Plan set out in Schedule 1 to this Project Agreement.
- 4.2. Each Party shall be responsible for its own taxes, including all and any Goods and Services Tax payable under this Project Agreement.

5. REVIEW MEETINGS (As applicable)

The Parties agree to hold monthly review meetings to review the implementation of the Research Project.

6. IMPLEMENTATION TIME SCHEDULE

The Parties shall perform the Research Project in accordance with the project schedule as set out in the Work Plan.

7. DELIVERABLES

The Parties shall upon completion of the Research Project provide the Deliverables as specified in the Research Plan.

8. TERM OF PROJECT AGREEMENT

This Project Agreement shall come into force on the 1st January 2024 ("Effective Date") and shall continue for a period of 15 months (the "**Term**") unless terminated earlier in accordance with Clause 10 of the Master Agreement. Notwithstanding the foregoing, this Agreement may be extended by mutual written agreement of the Parties.

9. LIMITATION OF LIABILITY

Notwithstanding anything to the contrary in the Master Agreement or this Project Agreement, each Party's liability for any cause whatsoever related to the subject matter of this Project Agreement and regardless of the form of action, whether in contract or in tort, including negligence, shall be limited to a sum computed with reference to the total value of the Research Project which sum for the purposes of this Agreement is S\$10,000. For the avoidance of doubt, nothing in this Clause 9 shall be deemed to

RESEARCH COLLABORATION AGREEMENT

eliminate or limit, in any respect, any Party's payment obligations as set out under Schedule 1 of this Agreement. This clause shall not apply to liability arising out of acts of wilful misconduct or gross negligence.

10. NOTICES

- 10.1. Any notice to be given by a Party to this Project Agreement shall be in writing and shall be deemed duly served if delivered personally or by prepaid registered post, or by e-mail to the addressee at the address or e-mail address of that Party as set out below, or at such other address or e-mail address as the Party to be served may have notified the other Party for the purposes of this Project Agreement:

NTU:

Scientific/Technical Matters and Project Management Matters:

Attn: Assistant Professor Yan Zhenzhen
Address: School of Physical and Mathematical Sciences
21 Nanyang Link
Singapore 637371
Email: yanzz@ntu.edu.sg

Intellectual Property Matters:

Name: Attn: CEO (NTU Ref: REQ0393784)
Address: Nanyang Technological University – NTUitive Pte Ltd
71 Nanyang Drive, Unit 03-01,
Singapore 638075
Fax: (+65) 6792 1737

Company:

Attn: Mr Chandra Suwandi Wijaya
Address: Singapore Technology Centre,
Panasonic Industrial Devices Singapore,
3 Bedok South Road,
Singapore 469269
Email: chandra.wijaya@sg.panasonic.com
Phone: +65-62419866

- 10.2. Any notice given pursuant to Clause 10.1 shall be deemed to have been received:
- (a) in the case of delivery by hand, when delivered; or
 - (b) in the case of sending by post:
 - (i) where posted in the country of the addressee, on the third (3rd) Business Day following the day of posting; and
 - (ii) where posted in any other country, on the seventh (7th) Business Day following the day of posting; or

RESEARCH COLLABORATION AGREEMENT

- (c) if sent by email on a Business Day and at a time which is during business hours on a Business Day, at the time it is transmitted to the relevant email box specified above.

- 10.3. For the avoidance of doubt, a termination notice, the service of any proceedings or documents in any legal action or, where applicable, any arbitration or other method of dispute resolution shall only be deemed to have been received if delivered personally or by prepaid registered post to the addressee at the address as provided in Clause 10.1.

11. COUNTERPARTS

The Parties may sign this Agreement in one (1) or more counterparts by the duly authorised representatives of the Parties, each of which constitutes an original and all of which taken together shall constitute the Project Agreement PROVIDED THAT this Project Agreement shall not be in force and effect until the counterparts are exchanged. The Parties may sign and deliver this Project Agreement by emailed portable document format ("PDF") document (or other mutually agreeable document format), and a reproduction of this Project Agreement with a Party's signature made by PDF, sent by email shall have the same effect as and be enforceable as a signed and delivered original version of this Project Agreement.

12. OTHER CONDITIONS (AS APPLICABLE)

RESEARCH COLLABORATION AGREEMENT

IN WITNESS WHEREOF the Parties have caused this Project Agreement to be executed on the date first above written.

SIGNED by for and on behalf of

**NANYANG TECHNOLOGICAL
UNIVERSITY**

SIGNED by for and on behalf of

**PANASONIC INDUSTRIAL DEVICES
SINGAPORE PTE. LTD.**

Name: Professor Phan Anh Tuan
Designation: Chair, School of Physical
and Mathematical Sciences
Date:

Name: Mr Goh Shwi Chu
Designation: Deputy Managing
Director
Date:

In the presence of:

In the presence of:

Name: Asst Prof Yan Zhenzhen
Designation: NTU PI

Name: Mr Chan Kim Koon
Designation: Director (Singapore
Technology Centre)

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(v13March2020)

NTU Ref: REQ REQ0393784

RESEARCH COLLABORATION AGREEMENT

RESEARCH PROJECT

Title: Material procurement management optimization for B2B industrial devices

1. BACKGROUND/ INTRODUCTION / OBJECTIVES

In the context of a B2B manufacturing company the procurement for raw/semi-processed materials is very challenging due to dramatically volatile demand, passiveness nature of the business and surprisingly less explored in the academic research. In this project, we aim to develop a prototype system to determine the optimal procurement time and quantity of the raw/semi-processed materials subject to operational, administrative, and contractual constraints upon the vendor and the buyer (manufacturer), in a setting with multiple vendors offering at different price and quality/reliability levels.

The key factors to consider in this project includes but not limited to, i) material quality (raw and/or semi-processed), ii) lead time, iii) price, and iv) FX rate. Fig.1 given below provides the process flow diagram of the process of procurement and the key points for optimization. This has strong connection with commodity price such as Copper, Aluminium etc.

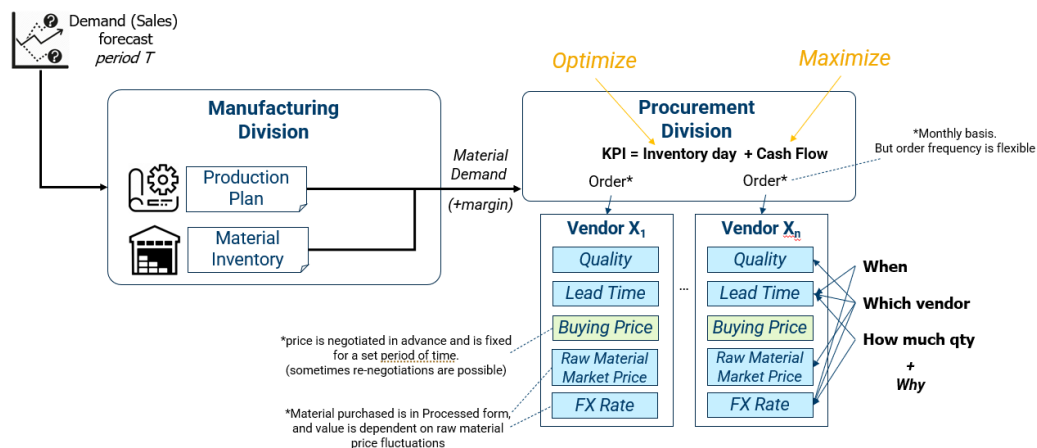


Fig.1: Process flow diagram of procurement process

Towards March 2024 the project is expected to deliver baseline solution for procurement and inventory management with state-of-the-art practices in this area, referred as *initial results* for the rest of this document. The *initial results* mentioned above should justify the potential value of the deliverable of the project and the technologies developed through this project is appreciated by potential business users and higher management. In other words, the *initial results* are to provide sufficient guarantee on the potential of AI/ML technologies (predictive and prescriptive) to improve the cash flow and/or other indicators that may be directly connected to business. For the purpose of *initial results*, simulated data may be used, emulating the statistical properties of the actual data.

Finally, to substantiate the technical superiority and novelty of the technology developed in this project the company and NTU may jointly or separately submit (and publish if accepted) research papers in appropriate venues as deemed by the Parties involved.

2. SCOPE OF WORK:

Part: I, till hiring of research staff at NTU and to deliver result by March 2024.

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(v13March2020)

NTU Ref: REQ REQ0393784

RESEARCH COLLABORATION AGREEMENT

1. Background research: Brief background research on existing practices for procurement management optimization. In addition to it, the methodologies, technique, know-how or other knowledge that are contained in the papers published by NTU to be utilized to the Project will be clarified.

2. Case studies with simulated data- empirical results to highlight the potential of investing on advanced technologies for procurement management.

Part: II, after research stuff is hired at NTU

1. Identifying performance bottleneck of the existing models and frameworks. Even there may be some uniqueness in our settings due to which some of the existing models are not applicable to our case.

2. Identify opportunities of improvement and develop strategies to achieve improvement-leveraging appropriate theoretical and computational techniques (likely to be advanced).

3. Develop a prescriptive framework to generate prescriptions about the procurement in term of: i) when, and ii) how much to order.

4. Result evaluation on simulated and real data.

5. Improvement by considering specific attributes of operational details/model/data.

6. Preparation of Final report, related codes for delivery.

3. RESEARCH PROJECT SCHEDULE / TIME FRAME

An indication of the Research Project schedules, time frames, milestones, update reports, etc, may be put in a tabulated format for easy reference, e.g.

Activity	Q1	Q2	Q3	Q4	Q5
Background research					
Case studies with simulated data					
Release of <i>initial results</i>	For management review (Mar 24)				
Performance evaluation in with simulated data					
Identification of performance bottleneck					
Identify opportunities of improvement					
Develop a framework to modeling and solving the problem					
Result evaluation					
Improvement by considering specific attributes of operational details					
Code release					
Final report delivery					

4. DELIVERABLES

The deliverables for this Research Project are:

1. Mathematical model, algorithms for procurement optimization outperforming the existing methods/practices.

2. Software for procurement optimization, code with documentation

CONFIDENTIAL

(v13March2020)

NTU Ref: REQ REQ0393784

RESEARCH COLLABORATION AGREEMENT

3. Final project report.

5. CONTRIBUTIONS TO THE RESEARCH PROJECT / BUDGET

Notes:

1. NTU's prevailing overhead charge is applicable on the Total Direct Project Cost funding by the Company to NTU.
2. If any NTU Cash Contribution is subject to further approval, please highlight this to the Contracts Officer.
3. Some sections may not be applicable. Please indicate "NA" where necessary.

(a)	<u>In-kind Contribution by NTU to the Research Project</u> (e.g. Existing equipment, manpower, etc. required for the Research Project – to assign estimated monetary values) <u>Equipment</u>	S\$
	Mac air laptop	7,200
	<u>Manpower</u>	
	Principal Investigator	12,000
	<u>Others</u>	
	Existing space	16,840
	Others 2	
	Total:	36,040
(b)	<u>Cash Funding by NTU to the Research Project (if applicable)</u>	S\$
	<u>Equipment</u>	N.A.
	Equipment 1	
	Equipment 2	
	<u>Manpower</u>	N.A.
	Postdoctoral Fellow	
	Research Assistant/ Fellow/ Engineer/ etc.	
	<u>Consumables</u>	N.A.
	Chemicals, etc.	
	<u>Others</u>	N.A.
	Others 1	
	Others 2	
	Total:	N.A.
(c)	<u>In-kind Contribution by the Company to NTU to carry out the Research Project</u>	
	<u>Equipment</u>	
	Equipment 1	
	Equipment 2	
	<u>Manpower</u>	S\$ 60,000

CONFIDENTIAL

(v13March2020)

NTU Ref: REQ REQ0393784

RESEARCH COLLABORATION AGREEMENT

Consumables

Chemicals, etc.

Others

Others 1

Others 2

Total: 60,000

(d) **Funding by the Company to NTU to carry out the Research Project**

S\$

Equipment

Equipment 1

Equipment 2

Manpower

Postdoctoral Fellow/ Engineer

100,000

Research Assistant/ Fellow/ Engineer/ etc.

Consumables

Chemicals, etc.

Others

Others 1

Others 2

Total Direct Project Cost 100,000

30% Overhead Charge on Total Direct Project Cost

30,000

Total Amount Payable*

[Total Direct Project Cost + 30% Overhead Charge]

130,000

*exclusive of any applicable prevailing GST

Note:

- *This is a fixed price contract*
- *NTU is given the authority to vary the stipulated budget items under (d) above, if required, provided the Total Amount Payable is not exceeded.*

6. PAYMENT SCHEDULE

The Company shall pay the Total Amount Payable of **\$130,000** (and any prevailing GST payable by the Company thereon)

- Upon signing of this agreement: SGD 30,000
- Upon submission of background research report and *initial results*: SG 50,000 (by May 2024)
- Upon submission of Final report, model, algorithms, codes: 50,000 (Payment can be released by Mar 2025)

Notes:

- Payment of the Total Amount Payable may be staggered but funds required for the work to be carried out must be provided in advance.*
- NTU will not accept terms that provide for withholding of payment if the Company is not satisfied with the results.*
- All payments shall be made within thirty (30) days from the scheduled date of payment specified in the Payment Schedule above.*
- Any balance funds remaining following the completion of the Research Project shall*

CONFIDENTIAL

(v13March2020)

NTU Ref: REQ REQ0393784

RESEARCH COLLABORATION AGREEMENT

be the property of NTU and the Company is not entitled to any refund of unspent funds.

7. BACKGROUND INTELLECTUAL PROPERTY

(Please list down each Party's Background IP to be utilized in this Research Project, if applicable.)

a) NTU: Yes

Patents Filed

- Zhenzhen Yan and Shouchang Chen**. A Data-Driven Approach To Personalized Order-Holding Problems In Online Retailing. Singapore Provisional Patent Number: 10202108795P.

Technology Disclosure Filed

- Zhenzhen Yan and You Hui Goh*. Strategic Idling In Appointment Systems With Sequential Servers. Reference Number: [2021-388]
- Zhenzhen Yan, Zihao Li*, Hao Wang**. Sample-Based Online Generalized Assignment Problem with Unknown Poisson Arrivals. [2023-071]

b) Company: No

8. FOREGROUND INTELLECTUAL PROPERTY

a) Likelihood of protectable IP from this Research Project?

- **Patentable invention**

Possible

- **Other form of IP (e.g.: Proprietary Know-How/Copyright)**

Possible

b) Likelihood of commercialising/licensing the discovery/invention from this Research Project?

- **Commercialisation**

Possible