



PROTEKSI ISI LAPORAN AKHIR PENELITIAN FUNDAMENTAL - REGULER

Dilarang menyalin, menyimpan, memperbanyak sebagian atau seluruh isi proposal ini dalam bentuk apapun kecuali oleh pengusul dan pengelola administrasi penelitian dan pengabdian kepada masyarakat

LAPORAN AKHIR

1. JUDUL PENELITIAN

Peningkatan Daya Saing Petani Padi dengan Transformasi Pemasaran Berbasis Digital Pada Kelompok Tani Unggul Yogyakarta

Bidang Fokus	Tema	Topik (jika ada)	Prioritas Riset
Pangan	Teknologi pascapanen dan rekayasa teknologi pengolahan pangan	Precision agriculture	Swasembada pangan

Rumpun Ilmu Level 1	Rumpun Ilmu Level 2	Rumpun Ilmu Level 3
ILMU EKONOMI	ILMU MANAJEMEN	Manajemen

Skema Penelitian	Strata (Dasar/Terapan/Pengembangan)	Nilai SBK	Target Akhir TKT	Lama Kegiatan
Penelitian Fundamental - Reguler	Riset Dasar	150.000.000	3	1 Tahun

2. IDENTITAS PENGUSUL

Nama, Peran	Jenis	Program Studi/Bagian	Bidang Tugas	ID Sinta
SETYANI DWI LESTARI 0013116003 Ketua Pengusul Universitas Budi Luhur	Dosen	Manajemen	Mengelola dan memimpin seluruh tahapan penelitian, mulai dari perencanaan hingga implementasi. Bertanggung jawab dalam pengembangan model pemasaran digital berbasis pre-order dan strategi penerapannya. Serta menyusun kerangka teori pemasaran digital yang relevan dengan sektor pertanian, serta memetakan masalah pemasaran yang dihadapi oleh petani padi.	5978612
RETNO FUJI OKTAVIANI 0301119201 Anggota Universitas Budi Luhur	Dosen	Manajemen	Mengembangkan model strategi sistem pemasaran digital yang dapat meningkatkan efisiensi dan daya saing petani padi. Serta melakukan evaluasi terhadap potensi keberhasilan model pemasaran digital di sektor pertanian, dan memberikan rekomendasi bagi kebijakan atau langkah-langkah strategis yang dapat diambil.	5978144
MARDI HARDJANTO 0422036901	Dosen	Sistem Informasi	Merancang model dan pengembangan sistem pemasaran berbasis	5977626

Nama, Peran	Jenis	Program Studi/Bagian	Bidang Tugas	ID Sinta
Anggota Universitas Budi Luhur			digital, serta melakukan analisis dan pengembangan sistem e-commerce yang dapat menghubungkan petani dengan konsumen secara langsung, tanpa perantara.	
SRI PENI WASTUTININGSIH 0005026502 Anggota Universitas Gadjah Mada	Dosen	Penyuluhan dan Komunikasi Pertanian	Menganalisis situasi dan kondisi petani, menganalisis dampak penerapan pemasaran berbasis digital terhadap pendapatan dan jangkauan pasar produk padi. Serta memberikan rekomendasi strategi digitalisasi yang tepat untuk meningkatkan daya saing petani padi di Yogyakarta.	6195766
ERYCO MUHDALIHA 2431700059 Mahasiswa Universitas Budi Luhur	Mahasiswa	Ilmu Manajemen	Berkolaborasi dalam pengumpulan data dan penganalisisan hasil survei serta wawancara dengan petani untuk menggali pemahaman mengenai hambatan dan tantangan dalam implementasi sistem pemasaran digital.	-
PANCA MAULANA FIRDAUS 2431700091 Mahasiswa Universitas Budi Luhur	Mahasiswa	Ilmu Manajemen	Membantu ketua peneliti menyusun rekomendasi kebijakan manajerial yang dapat memfasilitasi transisi petani ke sistem pemasaran berbasis digital serta pembuatan banner dan draft HKI	-

3. MITRA KERJASAMA PENELITIAN (Jika Ada)

Pelaksanaan penelitian dapat melibatkan mitra kerjasama yaitu mitra kerjasama dalam melaksanakan penelitian, mitra sebagai calon pengguna hasil penelitian, atau mitra investor

Mitra	Nama Mitra	Dana
Kelompok Tani Unggul	Drs. Agus Setyo Pratomo	Tahun 1 Rp 0

4. LUARAN DAN TARGET CAPAIAN

Luaran Wajib

Tahun Luaran	Kategori Luaran	Jenis Luaran	Status target capaian	Keterangan
1	Artikel di Jurnal	Artikel di Jurnal Bereputasi Internasional	Accepted/Published	Scopus terindeks Q3, yang diterbitkan oleh Universiti Malaysia Sarawak. https://publisher.unimas.my/ojs/index.php/IJBS/about

5. ANGGARAN

Rencana Anggaran Biaya penelitian mengacu pada PMK dan buku Panduan Penelitian dan Pengabdian kepada Masyarakat yang berlaku.

Total RAB 1 Tahun Rp 111.420.000,00

Tahun 1 Total Rp 111.420.000,00

Kelompok	Komponen	Item	Satuan	Vol.	Biaya Satuan	Total
Analisis Data	HR Pengolah Data	Analisis Statistik	P (penelitian)	1	5.500.000	5.500.000
Analisis Data	HR Pengolah Data	Data kualitatif dengan Nvivo dan bibliometrik	P (penelitian)	1	5.500.000	5.500.000
Analisis Data	HR Pengolah Data	Honor pembuatan manual book prototipe	P (penelitian)	1	2.000.000	2.000.000
Analisis Data	HR Pengolah Data	Transkrip hasil wawancara	P (penelitian)	23	55.000	1.265.000
Bahan	ATK	Fotocopy kuesioner @5 lembar x 420 set	Paket	420	2.500	1.050.000
Bahan	ATK	Materai	Paket	20	12.000	240.000
Bahan	ATK	Notebook FGD	Paket	35	15.000	525.000
Bahan	Bahan Penelitian (Habis Pakai)	Amplop, Map, steples, klip 1 set	Unit	1	100.000	100.000
Bahan	Bahan Penelitian (Habis Pakai)	Pena untuk mengisi kuesioner @1 lusin	Unit	10	45.000	450.000
Bahan	Bahan Penelitian (Habis Pakai)	Paperone A4 75 gram/ Kertas HVS	Unit	2	60.000	120.000
Bahan	Bahan Penelitian (Habis Pakai)	Spanduk dan standing X Banner	Unit	2	150.000	300.000
Bahan	Bahan Penelitian (Habis Pakai)	Tinta Refill 1 set	Unit	1	174.000	174.000
Pengumpulan Data	Biaya konsumsi	Makan dan snack FGD 1 (petani unggul)	OH	30	74.000	2.220.000
Pengumpulan Data	Biaya konsumsi	Makan dan snack FGD 2 (Pemda dan Pakar)	OH	25	74.000	1.850.000
Pelaporan Hasil Penelitian dan Luaran Wajib	Biaya Pendaftaran KI	Pendaftaran Hak cipta model pemasaran berbasis digital bagi petani padi	Paket	1	200.000	200.000
Pelaporan Hasil Penelitian dan Luaran Wajib	Biaya Publikasi artikel di Jurnal Bereputasi Internasional	Publikasi ke jurnal bereputasi Q3 dan Proof reading	Paket	1	10.900.000	10.900.000
Pengumpulan Data	Biaya konsumsi	Rapat kerja dan evaluasi 9 orang sebanyak 3 kali	OH	27	75.000	2.025.000
Pengumpulan Data	HR Petugas Survei	Honor Petugas Survei 420 kuesioner di Yogyakarta	OH/OR	420	8.000	3.360.000
Pengumpulan Data	HR Pembantu Lapangan	Pembantu lapangan 3 orang (2 hari/mmng, 2 bulan)	OH	48	80.000	3.840.000
Pengumpulan Data	Honorarium narasumber	Wawancara dengan 3 orang pakar/akademisi	OJ	3	1.500.000	4.500.000
Pengumpulan Data	Honorarium narasumber	Wawancara dengan 3 orang pejabat pemerintah atau pejabat lingkungan	OJ	3	900.000	2.700.000
Pengumpulan Data	Honorarium narasumber	Wawancara dengan petani padi 17 orang	OJ	17	350.000	5.950.000

Kelompok	Komponen	Item	Satuan	Vol.	Biaya Satuan	Total
Pengumpulan Data	Penginapan	2 orang tim peneliti (2 malam)	OH	4	845.000	3.380.000
Pengumpulan Data	Penginapan	3 orang tim peneliti (5 malam)	OH	15	845.000	12.675.000
Pengumpulan Data	Transport	Sewa kendaraan Yogyakarta (4 hari)	OK (kali)	4	800.000	3.200.000
Pengumpulan Data	Transport	Transport dari dan ke Bandara Jogja (2 peneliti dan 2 tim peneliti)	OK (kali)	4	250.000	1.000.000
Pengumpulan Data	Transport	Transport survey dalam kota sebanyak 3x kunjungan	OK (kali)	3	200.000	600.000
Pengumpulan Data	Tiket	Transportasi udara CGK-Jogja PP 4 orang	OK (kali)	4	2.250.000	9.000.000
Pengumpulan Data	Transport	Transport Bandara dari dan ke CGK (2 peneliti dan 2 tim peneliti)	OK (kali)	8	250.000	2.000.000
Pengumpulan Data	Uang Harian	2 orang petugas kebersihan selama 8jam/2hari	OH	32	13.000	416.000
Pengumpulan Data	Uang Harian	2 orang tim peneliti (3 hari)	OH	6	420.000	2.520.000
Pengumpulan Data	Uang Harian	Anggota peneliti 3 (6 hari)	OH	6	420.000	2.520.000
Pengumpulan Data	Uang Harian	Anggota peneliti 1 (6 hari)	OH	6	420.000	2.520.000
Pengumpulan Data	Uang Harian	Ketua Peneliti (6 hari)	OH	6	420.000	2.520.000
Sewa Peralatan	Peralatan penelitian	Subscription software desain dan zoom meeting	Unit	1	1.800.000	1.800.000
Sewa Peralatan	Peralatan penelitian	Virtual Private Server (8vCPU Cores RAM 32 GB 400 GB NVMe Disk space 32 TB) dan penunjang prototipe	Unit	1	12.500.000	12.500.000

*. KEMAJUAN PENELITIAN

A. RINGKASAN

Urgensi penelitian ini timbul dari sektor pertanian padi yang merupakan pilar penting bagi perekonomian Indonesia yaitu ketergantungan pada perantara, ketidakpastian pasar, dan distribusi yang tidak efisien, yang menyebabkan harga jual hasil pertanian rendah dan tidak menguntungkan. Sistem pemasaran tradisional yang bergantung pada pedagang perantara seringkali tidak mencerminkan nilai sebenarnya dari produk pertanian dan memperburuk kesejahteraan petani. Penelitian ini bertujuan untuk mengembangkan model pemasaran digital dan mengimplementasikan sistem pemasaran dengan konsep pre-order yang dapat menghubungkan petani padi langsung dengan konsumen tanpa perantara. Dengan sistem ini, petani dapat memperkirakan permintaan dan merencanakan produksi lebih efisien, mengurangi risiko kerugian akibat pembusukan hasil panen, dan mengoptimalkan harga jual melalui transparansi yang lebih baik. Selain itu, bagi konsumen, sistem ini memberikan harga yang lebih kompetitif dan jaminan kualitas produk. Metode penelitian yang digunakan adalah research & development (R&D), yang meliputi analisis kebutuhan dan studi literatur terkait pemasaran digital dalam sektor pertanian untuk memahami tantangan serta solusi yang ada. Peneliti juga melakukan survei dan wawancara dengan petani padi untuk menggali permasalahan

serta tingkat kesiapan mereka dalam mengadopsi teknologi digital. Selanjutnya dilakukan penyebaran kuesioner kepada petani di Yogyakarta untuk menguji model yang dirancang. Perancangan sistem pemasaran berbasis digital pre-order dirancang dan dikembangkan menggunakan metodologi Agile agar sistem yang dihasilkan fleksibel dan sesuai dengan kebutuhan. Luaran yang ditargetkan dari penelitian ini adalah publikasi ilmiah pada jurnal internasional bereputasi dan pengembangan model pemasaran digital berbasis ecommerce yang dapat diimplementasikan oleh petani padi. Penelitian ini juga menghasilkan desain prototipe sistem e-commerce yang fungsional. Dengan demikian, diharapkan penelitian ini dapat memberikan dampak signifikan dalam meningkatkan kesejahteraan petani padi dan menciptakan sistem distribusi pertanian yang lebih efisien dan transparan.

B. KATA KUNCI

Digitalisasi; Pemasaran; Petani; Padi; Penjualan

false

Pengisian poin C sampai dengan poin H mengikuti template berikut dan tidak dibatasi jumlah kata atau halaman namun disarankan ringkas mungkin. Dilarang menghapus/modifikasi template ataupun menghapus penjelasan di setiap poin.

C. HASIL PELAKSANAAN PENELITIAN: Tuliskan secara ringkas hasil pelaksanaan penelitian yang telah dicapai sesuai tahun pelaksanaan penelitian. Penyajian meliputi data, hasil analisis, dan capaian luaran (wajib dan atau tambahan). Seluruh hasil atau capaian yang dilaporkan harus berkaitan dengan tahapan pelaksanaan penelitian sebagaimana direncanakan pada proposal. Penyajian data dapat berupa gambar, tabel, grafik, dan sejenisnya, serta analisis didukung dengan sumber pustaka primer yang relevan dan terkini.

Penelitian ini berjudul "Peningkatan Daya Saing Petani Padi dengan Transformasi Pemasaran Berbasis Digital Pada Kelompok Tani Unggul Yogyakarta". Hasil penelitian tahun 2025 meliputi analisis permasalahan petani padi dengan pengembangan model digitalisasi pemasaran, dan pembuatan prototipe sistem pemasaran e-commerce yang bertujuan untuk meningkatkan akses pasar, mengurangi ketergantungan pada tengkulak, memperkuat transparansi harga, serta mendorong peningkatan pendapatan dan daya saing petani padi. Proses penelitian meliputi analisis permasalahan petani dengan melakukan wawancara terhadap petani, FGD dengan pemda, praktisi dan pakar, melakukan pemetaan literatur untuk pengembangan model, penyebaran kuesioner, pembuatan sistem prototipe hingga publikasi karya ilmiah pada jurnal internasional terindeks Scopus.

1. Wawancara dengan Ketua Kelompok Tani Unggul

Perwakilan dari tim peneliti melakukan pendekatan awal dengan melakukan wawancara kepada Bapak Agus selaku ketua Kelompok Tani Unggul pada 9 Juni 2025 di kediaman beliau, Cepit. Dari hasil wawancara ini diperoleh gambaran awal mengenai kondisi kelompok tani. Kelompok Tani Unggul beranggotakan 17 orang, mayoritas berusia di atas 40 tahun. Pertemuan kelompok masih jarang dilakukan, bahkan grup WhatsApp belum diikuti oleh seluruh anggota. Aktivitas bersama belum terstruktur, sehingga sebagian besar kegiatan usahatani dilakukan secara individu.

Luas lahan yang dikelola rata-rata sekitar 2.000 m², sebagian besar adalah lahan milik sendiri, sementara sebagian kecil merupakan lahan saku dengan sistem bagi hasil 60:40, di mana seluruh biaya usahatani ditanggung penyakap. Jenis tanaman utama adalah padi dan cabai, dengan varietas padi C4 yang cukup dominan. Produksi padi rata-rata mencapai 4–5 ton per hektar, sementara biaya produksi untuk 2.000 m² sekitar Rp1 juta. Metode budidaya yang digunakan masih konvensional, dengan pupuk kimia seperti urea dan TSP sebagai andalan, kadang ditambah pupuk kandang. Sertifikasi produk organik dinilai masih terlalu mahal bagi kelompok tani ini. Dari segi tenaga kerja, sebagian besar memanfaatkan tenaga keluarga, dengan teknik tanam masih memakai 3–5 bibit per lubang, meskipun hal ini dinilai kurang efisien.

Dalam aspek pemasaran, penjualan gabah dilakukan secara mandiri oleh masing-masing anggota, dengan sekitar 70% hasil panen dijual ke pasar baik dalam bentuk gabah maupun beras, sedangkan sisanya untuk konsumsi keluarga. Belum ada mekanisme kolektif dalam menjual hasil panen, sehingga daya tawar kelompok terhadap pasar masih rendah. Wawancara ini juga mencatat kebutuhan untuk melengkapi data harga jual produk dan membuka peluang bagi penyelenggaraan FGD di Cepit sebagai tindak lanjut.

2. Wawancara dengan Kelompok Tani Unggul

Tim peneliti melakukan wawancara langsung terhadap 17 anggota Tani Unggul di Aula Cepit, Beji Harjobinangun, Pakem, Sleman pada tanggal 1 Juli 2025. Kegiatan ini dilakukan dengan berinteraksi langsung kepada para petani untuk berdiskusi mengenai pengalaman dan tantangan yang dihadapi petani padi dalam menjual produk, serta tanggapan dan aspirasi Petani terhadap Sistem Pre-Order dan Sistem E-commerce. Pada kegiatan ini terlihat bahwa usia petani di kelompok tani unggul berusia diatas 40 tahun, namun mereka dapat diajak berdiskusi dengan baik. Hasil dari kegiatan ini menjadi analisis permasalahan awal bagi para petani dalam memasarkan padi. Petani Cepit Beji masih menghadapi tantangan klasik berupa akses sarana produksi yang terbatas, biaya tinggi, ketergantungan pada pengepul, dan rendahnya kemandirian dalam menentukan harga. Dari sisi digitalisasi, ada hambatan besar pada literasi digital, keterbatasan waktu, serta rendahnya motivasi untuk mencoba sistem e-commerce. Walaupun sebagian kecil petani terbuka pada pendampingan, mayoritas merasa bahwa sistem digital bukan prioritas karena mereka sudah terbiasa dengan mekanisme pengepul yang cepat dan praktis.

Dengan demikian, intervensi yang dibutuhkan bukan hanya berupa penyediaan aplikasi, tetapi juga:

- a. Pendampingan intensif dan pelatihan praktis agar petani terbiasa menggunakan teknologi.
- b. Penyediaan infrastruktur (mesin giling, transportasi, akses internet).
- c. Kebijakan subsidi pupuk/pestisida yang lebih adil dan sesuai kebutuhan.
- d. Program regenerasi tani agar anak muda mau terlibat dalam pertanian berbasis digital.



Gambar 1. Dokumentasi wawancara dengan Petani

3. FGD dengan Pemda, Praktisi, dan Akademisi

Kegiatan selanjutnya tim peneliti melakukan FGD pada tanggal 2 Juli 2025 di Aula Kapanewon Pakem dengan pemerintah daerah yang diwakili oleh Panewu Kapanewon Pakem, Lurah Kalurahan Harjobinangun, dan Lurah Kalurahan Margokaton. Dihadiri juga oleh pakar akademi dibidang pertanian dan pemasaran dari Universitas Gadjah Mada yaitu Bapak Prof. Dr. Jamhari, S.P., M.P. dan Ibu Dr. Ir. Lestari Rahayu Walujati, M.P. Selain itu kami juga mengundang praktisi dari ketua tani unggul dan perwakilan dari petani milenial untuk hadir memberikan pandangan mereka terhadap situasi pemasaran padi saat ini.

Lurah dari Margokaton dan Harjobinangun pada dasarnya menghadapi persoalan struktural yang sama, yaitu keterbatasan sarana produksi (irigasi, air, listrik sawah, mesin penggiling), dominasi tengkulak, serta lemahnya regenerasi petani milenial. Sebagian besar petani di wilayah mereka adalah petani gurem dengan lahan sempit, sehingga hasil panen hanya cukup untuk konsumsi rumah tangga atau sekadar menutup biaya produksi. Meski demikian, terdapat variasi kondisi antarwilayah: Margokaton misalnya sangat tradisional dengan problem irigasi dan hama tikus, sementara Canden di desa lain relatif lebih produktif dengan hasil hingga 8,5 ton/ha namun terkendala modal dan infrastruktur air. Harjobinangun sudah memiliki akses program dana IS dan kelompok tani yang lebih aktif, walau orientasinya masih dominan ke hortikultura. Pringombo yang tadah hujan lebih fokus pada ketahanan pangan dan bergantung pada tengkulak polowijo, sedangkan Tanjungharjo memiliki dukungan LKMA namun terkendala kredit macet dan minim minat regenerasi.

Dari sisi pakar, Bu Lestari menekankan bahwa 93% petani adalah petani gurem sehingga kelembagaan seperti Gapoktan harus diperkuat menjadi badan hukum koperasi. Tantangan utama adalah

literasi digital dan pencatatan keuangan yang masih rendah, ditambah keterikatan petani pada pembiayaan tengkulak. Ia menilai bahwa sosialisasi digitalisasi harus dilakukan melalui kelembagaan tani, bukan perorangan, dan dengan memperhatikan kapasitas pengembalian pinjaman agar tidak menjerat petani. Sementara Prof. Jamhari menyoroti persoalan struktural pemasaran padi. Dengan 80% petani masih menjual dengan sistem tebasan, sulit bagi mereka untuk menikmati nilai tambah dari beras. Dominasi penggilingan dalam rantai distribusi membuat petani tidak punya kuasa harga. Menurutnya, transformasi digital hanya bisa efektif jika disertai transformasi mindset petani untuk menjual beras, bukan gabah, serta penguatan kelembagaan yang mampu menyediakan fasilitas penyimpanan, penggilingan, hingga distribusi. Tanpa pelembagaan yang kuat, digitalisasi hanya menjadi solusi parsial.

Dari sisi praktisi (petani milenial), sebenarnya ada contoh bahwa menjual dalam bentuk beras dapat meningkatkan nilai, namun kendala muncul dari skala lahan yang kecil, modal yang terbatas, dan margin keuntungan yang sangat tipis (<4%). Petani menilai bahwa menjual beras sendiri tanpa dukungan kelembagaan dan jaringan pasar justru bisa merugikan. Oleh karena itu, sebagian petani masih memilih mekanisme tebasan atau menjual gabah kepada pengepul.

Hasil dari FGD ini menjadi dasar penting dalam merancang model digitalisasi petani, karena masukan dari para lurah, pakar, dan praktisi petani mencerminkan kondisi riil di lapangan, tantangan struktural, serta kebutuhan nyata petani. Temuan tersebut kemudian diintegrasikan ke dalam desain model agar solusi digitalisasi yang dihasilkan lebih kontekstual, aplikatif, dan sesuai dengan karakteristik lokal petani padi di Yogyakarta.



Gambar 2. Dokumentasi FGD

4. Wawancara dengan Kepala Desa di Yogyakarta

Pada tanggal 30 Juli 2025, tim peneliti mengunjungi Kabupaten Gunung Kidul dan bertemu dengan Ibu Lurah Pringombo. Hasil wawancara menjelaskan bahwa kondisi petani di Pringombo hanya terjadi musiman karena sulitnya irigasi air ke ladang. Situasi ini menggambarkan bahwa sebagian besar lahan

pertanian masih bersifat tadah hujan, sehingga produktivitas sangat bergantung pada musim dan cuaca. Ketika musim hujan, petani dapat menanam padi, namun saat musim kemarau mereka beralih ke tanaman palawija atau bahkan tidak bisa menanam sama sekali. Keterbatasan sarana irigasi modern menyebabkan kontinuitas produksi pangan terganggu, sementara hasil panen yang ada umumnya hanya digunakan untuk kebutuhan rumah tangga. Untuk pemasaran, para petani di Pringombo masih menjual hasil panennya dalam bentuk gabah kepada tengkulak atau konsumsi sendiri. Harga sepenuhnya ditentukan oleh tengkulak sehingga posisi tawar petani sangat lemah. Hasil panen jarang diolah menjadi beras karena keterbatasan fasilitas penggilingan dan tempat penyimpanan. Dengan kondisi ini, petani lebih memilih menjual langsung setelah panen agar mendapatkan uang cepat meski dengan margin yang rendah.

Selanjutnya pada tanggal 3 Agustus, tim peneliti mengunjungi kabupaten Kulonprogo dan bertemu dengan Lurah Tanjungharjo dan bertemu langsung dengan perwakilan petani di daerah tersebut untuk berdiskusi secara langsung. Desa Tanjungharjo berpangkal pada skala usaha gurem, ketergantungan pada jalur pemasaran konvensional (tebasan/pengumpul), dan lemahnya kelembagaan serta diperparah oleh keterbatasan infrastruktur dan pembiayaan. Secara teknis, desa ini berada pada wilayah layanan DI Kalibawang yang menjadi nadi irigasi Kulonprogo, namun membutuhkan pemeliharaan, sehingga kontinuitas air tidak selalu andal bagi petani kecil yang biaya produksinya sensitif terhadap gangguan pasokan air. Dari sisi harga dan saluran jual, pola yang dominan adalah menjual gabah kering ke pengepul/penebas (bukan beras), karena petani tidak memiliki fasilitas giling dan logistik, akibatnya posisi tawar rendah dan harga sering di bawah standar. Pada awal 2025 sempat berada di Rp5.100–5.800/kg (di bawah HPP Rp6.500/kg) sampai Dinas Pertanian mempertemukan petani dengan Bulog. Intervensi berikutnya, Bulog DIY mulai aktif menyerap GKP di Kulonprogo pada April 2025 dengan harga Rp6.500/kg, yang sementara menahan tekanan harga tengkulak dan memberi ruang margin bagi petani. Program serapan ini dilaporkan berlanjut dan ditingkatkan sepanjang tahun. Dari sisi kelembagaan dan SDM lokal, menegaskan minat petani milenial rendah, sebagian kredit LKMA macet, dan keputusan produksi dan pemasaran masih sangat individual semuanya membuat adopsi pemasaran digital sulit tanpa pendampingan, admin kelembagaan (Gapoktan/BUMDes) yang aktif, dan skema pembiayaan yang realistis.



Gambar 3. Dokumentasi Wawancara dengan Lurah Pringombo dan Tanjungharjo

5. Penyusunan Model digitalisasi Pemasaran Petani

Pada tanggal 4 Agustus 2025, tim peneliti mulai menyusun model digitalisasi petani yang disesuaikan dengan kondisi nyata dan permasalahan yang teridentifikasi selama proses pengumpulan data lapangan serta

wawancara dengan petani, lurah, dan praktisi pertanian. Model ini tidak hanya merespons persoalan mendasar seperti keterbatasan akses irigasi, ketergantungan pada tengkulak, rendahnya literasi digital, serta minimnya regenerasi petani milenial, tetapi juga memperhatikan variasi lokal di tiap wilayah (Cepit, Margokaton, Pringombo, Tanjungharjo, dan Harjobinangun).

Untuk memperkuat fondasi akademik, tim peneliti melakukan *literature review* dengan mengintegrasikan *grand theory Theory of Planned Behavior* (TPB) yang menjelaskan peran sikap, norma sosial, dan kontrol perilaku dalam membentuk niat adopsi teknologi dengan *middle theory Unified Theory of Acceptance and Use of Technology* (UTAUT) yang menekankan faktor harapan kinerja, kemudahan penggunaan, pengaruh sosial, dan kondisi pendukung. Integrasi dua kerangka teori ini menghasilkan model e-commerce pertanian yang holistik, di mana aspek psikologis petani (sikap, hambatan pengalaman, literasi digital) dihubungkan dengan faktor struktural dan teknis yaitu infrastruktur, dukungan kelembagaan, serta fasilitas pemerintah dan pasar. Dengan pendekatan ini, tercipta rancangan model pemasaran digital yang tidak hanya bersifat konseptual, tetapi juga praktis dan siap diadopsi oleh petani, khususnya di wilayah Yogyakarta. Model ini diharapkan mampu mendorong peningkatan daya saing petani padi melalui transparansi harga, perluasan akses pasar, penguatan kelembagaan lokal, dan optimalisasi peran generasi muda dalam pertanian digital.

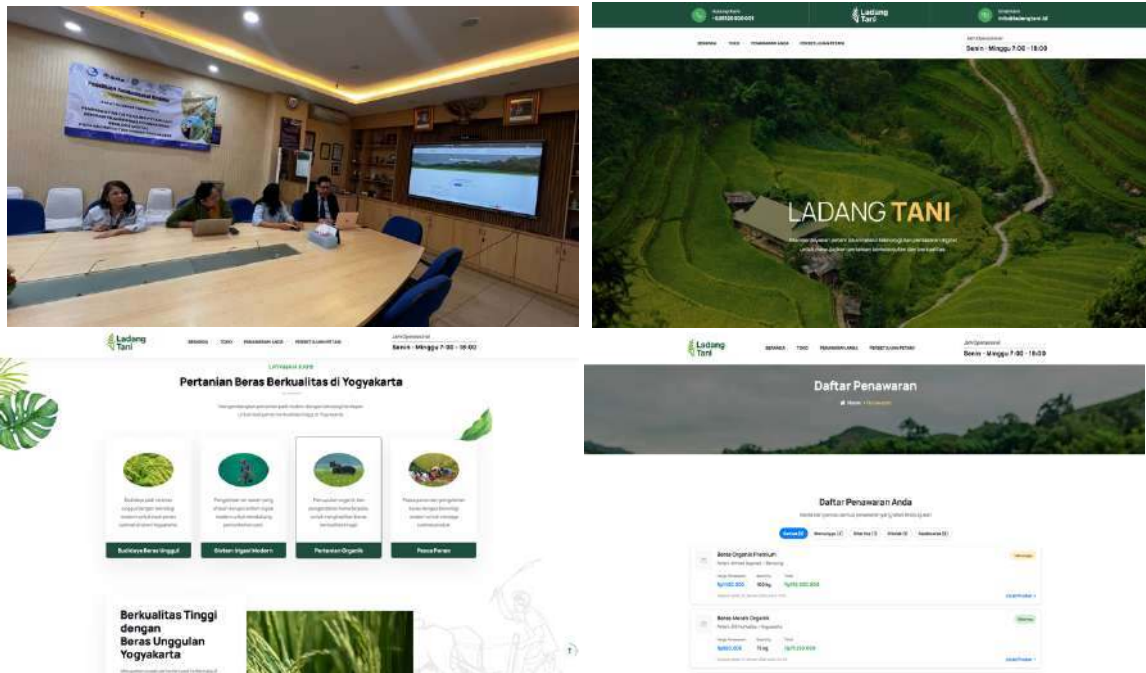


Gambar 4. Dokumentasi Penyusunan Model

6. Prototipe Sistem Pemasaran E-commerce Petani

Tim peneliti telah berhasil mengembangkan prototipe sistem digital yang dirancang khusus untuk menjawab permasalahan klasik petani, yaitu ketergantungan pada satu pengepul yang seringkali menguasai harga dan melemahkan posisi tawar petani. Prototipe ini menyediakan fitur sistem penawaran terbuka, di mana hasil panen petani dapat ditawarkan secara langsung kepada berbagai pihak sekaligus, mulai dari pengepul, pedagang, hingga konsumen akhir. Dengan demikian, petani dapat membandingkan penawaran harga terbaik, memilih mitra dagang yang paling menguntungkan, dan mengurangi risiko praktik monopoli harga.

Selain itu, prototipe ini juga dilengkapi dengan dashboard penawaran yang transparan, informasi harga pasar terkini, serta opsi untuk menampilkan kualitas dan variasi produk. Melalui mekanisme ini, petani tidak hanya memperoleh akses pasar yang lebih luas, tetapi juga memiliki kendali yang lebih besar terhadap hasil panennya. Dengan adanya prototipe ini, diharapkan terjadi perubahan mendasar pada ekosistem pemasaran hasil pertanian, dari sistem yang semula tertutup dan dikuasai segelintir pengepul, menuju sistem digital yang lebih transparan, kompetitif, dan berpihak pada petani.



Gambar 5. Dokumentasi Simulasi Prototipe

7. Capaian Luaran Penelitian

Sektor pertanian, khususnya produksi padi, merupakan salah satu tulang punggung perekonomian Indonesia [1]. Namun, petani padi menghadapi berbagai tantangan yang menghambat potensi mereka untuk berkembang [2]. Tantangan tersebut meliputi rendahnya harga jual hasil pertanian akibat ketergantungan pada perantara, ketidakpastian pasar, dan distribusi yang tidak efisien [3], [4]. Tantangan yang dihadapi oleh petani padi ini, jika tidak segera ditangani, dapat menghambat pencapaian salah satu tujuan dalam Tujuan Pembangunan Milenium (MDGs), yaitu mengurangi kemiskinan dan kelaparan (MDG 1). Data BPS menunjukkan jika produksi padi dikonversikan menjadi beras untuk konsumsi pangan penduduk, produksi padi sepanjang tahun 2023 diperkirakan setara dengan 26,11 juta ton beras atau mengalami penurunan sebesar 58,56 ribu ton beras (0,22 persen) dibandingkan tahun 2022 yang sebesar 26,17 juta ton beras [5]. Produktivitas padi erat kaitannya dengan adopsi teknologi pertanian, studi di Yogyakarta mencatat bahwa petani yang mengadopsi varietas unggul dan teknik pertanian berkelanjutan mengalami peningkatan pendapatan hingga 16% [6].

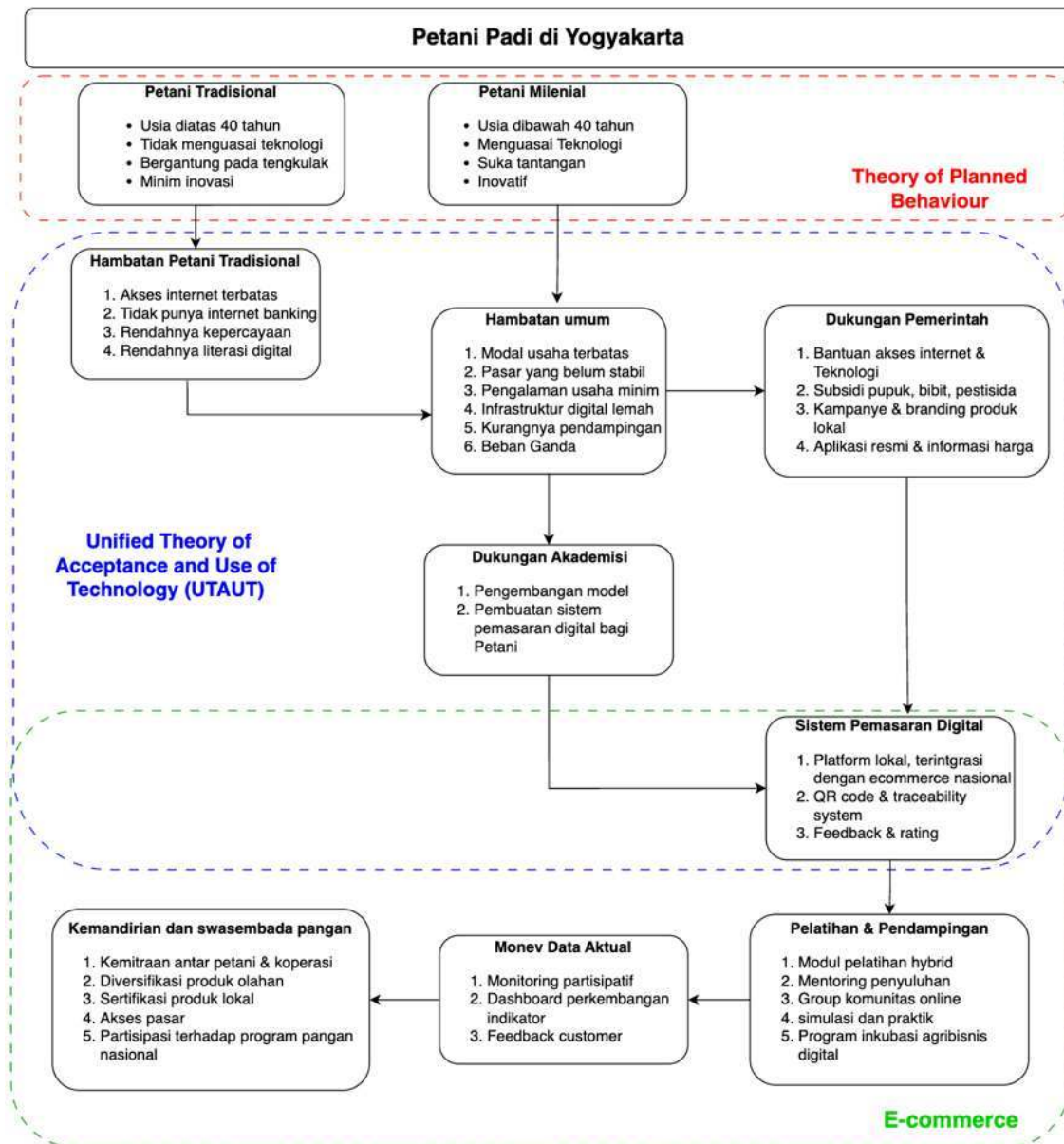
Sistem pemasaran yang tradisional, di mana petani mengandalkan pasar lokal atau pedagang perantara, sering kali tidak mencerminkan nilai sebenarnya dan berpotensi menyebabkan kerugian [7]. Kurangnya transparansi dalam harga dan kualitas, serta ketergantungan pada metode distribusi yang tidak efisien, menyebabkan petani padi mengalami kesulitan dalam meningkatkan kesejahteraan [8]. Kondisi ini juga diperburuk dengan fluktuasi harga yang tidak dapat diprediksi dan ketidakmampuan petani dalam memasarkan hasil pertanian mereka secara langsung kepada konsumen akhir [9], [10].

Untuk mengatasi permasalahan ini, solusi transformasi digital seperti sistem pemasaran e-commerce melalui konsep pre-order dapat menjadi pilihan yang efektif [11]. Konsep pre-order dalam pemasaran memberikan kesempatan bagi petani padi untuk memasarkan hasil panen dengan cara yang lebih efisien dan terstruktur [12]. Dalam sistem ini, konsumen dapat melakukan pemesanan terlebih dahulu sebelum hasil panen tersedia, yang memberikan keuntungan ganda: bagi petani, mereka dapat memperkirakan permintaan dengan lebih akurat, dan bagi konsumen, mereka dapat membeli produk dengan harga yang lebih transparan dan kompetitif [13], [14]. Penjualan dengan konsep ini juga dapat mengurangi risiko kerugian bagi petani yang sering kali dihadapkan pada pembusukan hasil panen akibat tidak terjualnya produk dalam waktu tertentu [15]. Dengan digitalisasi, petani dapat merencanakan produksi sesuai dengan permintaan yang sudah ada, sehingga mengurangi pemborosan [16], [17].

Melalui sistem ini, petani juga akan mendapatkan transparansi yang lebih baik terkait harga jual, serta dapat memperkenalkan produk mereka kepada pasar yang lebih luas [18]. E-commerce yang didukung oleh teknologi digital memungkinkan pemantauan dan pelaporan yang lebih baik, serta memudahkan transaksi secara online yang lebih efisien [19], [20]. Penerapan sistem pemasaran berbasis digital dapat menjadi

langkah awal untuk memberdayakan petani padi dalam meningkatkan kesejahteraan mereka, mengurangi ketergantungan pada perantara, dan mengoptimalkan distribusi hasil pertanian [21]. Hal ini sejalan dengan upaya mencapai SDGs terkait pengentasan kemiskinan, dan pembangunan ekonomi yang inklusif dan berkelanjutan.

Masalah utama yang diidentifikasi adalah ketergantungan pada perantara dalam distribusi hasil panen, yang menyebabkan ketidakpastian harga dan margin keuntungan yang rendah bagi petani [22]. Oleh karena itu, solusi yang diajukan adalah pengembangan sistem pemasaran berbasis digital dengan konsep pre-order yang memungkinkan petani untuk menjual hasil pertanian mereka langsung kepada konsumen [12].



Sumber: FGD Pemda, Praktisi, Akademisi, 2025

Gambar 6. Theoretical Framework

Model digitalisasi pemasaran bagi petani padi di Yogyakarta ini disusun berdasarkan hasil Focus Group Discussion (FGD) yang melibatkan berbagai pemangku kepentingan, termasuk pemerintah daerah, akademisi, pakar pertanian, praktisi, serta perwakilan petani. Model ini bertujuan untuk menjawab tantangan transformasi digital yang dihadapi petani, serta mendukung tercapainya kemandirian dan swasembada pangan berbasis teknologi. Pada tahap awal, model ini memetakan kondisi petani ke dalam dua kelompok utama, yaitu petani tradisional dan petani milenial. Petani tradisional umumnya berusia di atas 40 tahun, tidak menguasai teknologi, bergantung pada tengkulak, dan minim inovasi. Sementara itu, petani milenial yang berusia di bawah 40 tahun memiliki kecenderungan untuk lebih adaptif terhadap teknologi, menyukai tantangan, dan bersifat inovatif.

Segmentasi ini penting karena menentukan pendekatan intervensi yang berbeda dalam strategi pelatihan dan digitalisasi.

Masing-masing kelompok menghadapi tantangan yang berbeda. Petani tradisional cenderung mengalami hambatan seperti akses internet terbatas, tidak memiliki internet banking, rendahnya literasi digital, dan minimnya kepercayaan terhadap sistem teknologi [23]. Di sisi lain, hambatan umum yang dialami oleh seluruh petani meliputi keterbatasan modal usaha, pasar yang belum stabil, minimnya pengalaman dalam berwirausaha, lemahnya infrastruktur digital di pedesaan, kurangnya pendampingan, dan beban ganda dalam pekerjaan. Untuk menjawab hambatan tersebut, model ini menekankan pentingnya peran pemerintah dan akademisi. Pemerintah memberikan dukungan melalui penyediaan akses internet dan teknologi, subsidi pupuk dan pestisida, kampanye produk lokal, serta pengembangan aplikasi resmi untuk informasi harga dan pemasaran[24]. Di sisi lain, kalangan akademisi turut berperan melalui pengembangan model sistem pemasaran digital serta penyediaan platform edukasi dan pendampingan berbasis riset dan pengabdian masyarakat. Secara teoritis, model ini didasarkan pada TPB, yang menjelaskan bahwa niat perilaku petani dalam mengadopsi e-commerce dipengaruhi oleh sikap, norma sosial, dan persepsi kontrol perilaku. Untuk memperkuat dimensi teknologi, model ini juga mengadopsi UTAUT, yang menempatkan konstruk seperti performance expectancy, effort expectancy, social influence, dan facilitating condition sebagai determinan utama dalam pembentukan intensi dan perilaku penggunaan teknologi digital oleh petani [25], [26].

Implementasi dari model ini diwujudkan melalui pengembangan sistem pemasaran digital berbasis lokal yang terintegrasi dengan e-commerce nasional, dilengkapi dengan fitur QR code dan traceability system untuk menjamin keamanan dan kepercayaan konsumen. Sistem ini juga dibarengi dengan mekanisme feedback dan rating pelanggan. Dalam mendukung pengoperasiannya, dilakukan pelatihan dan pendampingan kepada petani melalui modul hybrid (online dan offline), mentoring dari penyuluh, pembentukan komunitas online, serta program inkubasi agribisnis digital. Untuk menjamin keberlanjutan, model ini juga mencakup aspek monitoring dan evaluasi berbasis data aktual, termasuk partisipasi petani dalam pelaporan perkembangan indikator dan masukan dari pelanggan. Keseluruhan proses ini diarahkan untuk mencapai kondisi ideal, yaitu kemandirian dan swasembada pangan. Indikator pencapaiannya meliputi terbentuknya kemitraan antarpetani dan koperasi, diversifikasi dan sertifikasi produk olahan, keterbukaan akses pasar nasional, serta partisipasi aktif dalam program-program pangan nasional.

D. STATUS LUARAN: Tuliskan jenis, identitas dan status ketercapaian setiap luaran wajib dan luaran tambahan (jika ada) yang dijanjikan. Jenis luaran dapat berupa publikasi, perolehan kekayaan intelektual, atau luaran lainnya yang telah dijanjikan pada proposal. Uraian status luaran harus didukung dengan bukti kemajuan ketercapaian luaran sesuai dengan luaran yang dijanjikan. Lengkapi isian jenis luaran yang dijanjikan serta mengunggah bukti dokumen ketercapaian luaran melalui BIMA.
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Luaran wajib adalah Artikel Ilmiah pada jurnal internasional bereputasi, yaitu Social Sciences & Humanities Open (Q1) <https://www.sciencedirect.com/journal/social-sciences-and-humanities-open> yang telah disubmit (dengan status under review) dimana status artikel dapat dilihat pada pre-print yang disediakan Elsevier, dan sudah tersedia online pada 6 September 2025 yaitu https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5450370. Artikel sudah mendapat revisi round pertama pada tanggal 31 Oktober, dan tim penulis sudah mengupload kembali revisi pertama pada tanggal 11 November 2025.

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Gambar 7. Luaran wajib penelitian

Hak cipta untuk model peningkatan daya saing petani padi dengan transformasi pemasaran berbasis digital pada kelompok Tani Unggul, Yogyakarta. Seta Hak Cipta untuk prototipe sistem pemasaran ladang tani.



Gambar 8. Luaran Tambahan Perolehan HKI model

E. PERAN MITRA: Tuliskan realisasi kerjasama dan kontribusi Mitra baik *in-kind* maupun *in-cash* serta mengunggah bukti dokumen pendukung sesuai dengan kondisi yang sebenarnya. Bukti dokumen realisasi kerjasama dengan Mitra dapat diunggah melalui BIMA.

Catatan:

Bagian ini wajib diisi untuk penelitian terapan, untuk penelitian dasar (Fundamental, Pascasarjana, PKDN, Dosen Pemula) boleh mengisi bagian ini (tidak wajib) jika melibatkan mitra dalam pelaksanaan penelitiannya

Penelitian ini menjalin kemitraan dengan kelompok Tani Unggul sebagai studi awal dalam analisis permasalahan petani padi di Yogyakarta. Selain itu penelitian ini melibatkan para ahli dari Pemerintah daerah yang diwakili oleh Panewu Kapanewon Pakem, Lurah Kalurahan Harjobinangun, dan Lurah Kalurahan Margokaton yang berkontribusi memberikan data permasalahan petani yang terjadi pada masing masing desa, hingga kontribusi dan dukungan yang diberikan oleh pemerintah daerah sebagai pemangku kebijakan yang berperan dalam menyediakan akses data, memberikan fasilitasi kebijakan, serta mendukung penguatan infrastruktur dan regulasi untuk mempercepat implementasi digitalisasi pertanian di tingkat lokal.



Gambar 9. Keterlibatan Pemda dalam penelitian

F. KENDALA PELAKSANAAN PENELITIAN: Tuliskan kesulitan atau hambatan yang dihadapi selama melakukan penelitian dan mencapai luaran yang dijanjikan, termasuk penjelasan jika pelaksanaan penelitian dan luaran penelitian tidak sesuai dengan yang direncanakan atau dijanjikan.

Selama pelaksanaan penelitian, tim menghadapi beberapa kesulitan yang cukup signifikan. Pertama, Karena hasil wawancara dengan petani di Cepit, Sleman, menunjukkan permasalahan yang tidak jauh berbeda seperti keterbatasan kelembagaan, praktik penjualan gabah secara individual, dan minimnya pemanfaatan teknologi digital maka tim peneliti memperluas jangkauan pengumpulan data ke beberapa wilayah lain untuk memperkaya referensi dan memastikan bahwa model digitalisasi yang dirancang benar-benar sesuai dengan kebutuhan riil petani di berbagai konteks lokal. Hambatan teknis di lapangan, seperti keterbatasan waktu petani untuk diwawancarai karena mereka lebih banyak menghabiskan waktu di sawah, serta kondisi geografis di beberapa wilayah (Gunung Kidul dan Kulonprogo) yang sulit dijangkau. Hal ini membuat proses pengumpulan data membutuhkan waktu lebih lama dari rencana awal. Selain itu, usia petani yang ada di Yogyakarta lebih banyak diatas usia 50 dimana mereka resisten terhadap inovasi digital. Banyak petani yang belum terbiasa dengan teknologi digital, bahkan untuk menggunakan aplikasi dasar sekalipun. Hambatan ini berdampak pada keterbatasan data eksperimen terkait adopsi prototipe sistem, karena sebagian besar petani hanya mau mencoba dalam skala terbatas.

Luaran penelitian berupa publikasi pada jurnal internasional bereputasi terindeks Scopus juga menghadapi beberapa kendala yaitu menemukan jurnal dengan scope yang sesuai. Selain itu, proses review dan revisi di jurnal internasional memerlukan waktu yang tidak sebentar. Artikel yang sudah berhasil di submit namun masih menunggu hasil review (under review). Selain itu, keterbatasan biaya publikasi juga menjadi tantangan tersendiri, mengingat beberapa jurnal internasional bereputasi khususnya elsevier mengenakan Article Processing Charge (APC) yang relatif tinggi.

G. RENCANA TAHAPAN SELANJUTNYA: Tuliskan dan uraikan rencana penelitian selanjutnya berdasarkan indikator luaran yang telah dicapai, rencana realisasi luaran wajib yang dijanjikan dan tambahan (jika ada) di tahun berikutnya serta *roadmap* penelitian keseluruhan. Pada bagian ini diperbolehkan untuk melengkapi penjelasan dari setiap tahapan dalam metoda yang akan direncanakan termasuk jadwal berkaitan dengan strategi untuk mencapai luaran seperti yang telah dijanjikan dalam proposal. Jika diperlukan, penjelasan dapat juga dilengkapi dengan gambar, tabel, diagram, serta pustaka yang relevan. Jika laporan kemajuan merupakan laporan pelaksanaan tahun terakhir, pada bagian ini dapat dituliskan rencana penyelesaian target yang belum tercapai.

Berdasarkan capaian penelitian tahun berjalan, rencana penelitian selanjutnya difokuskan pada penguatan implementasi dan penyempurnaan model digitalisasi petani padi berbasis e-commerce. Indikator luaran yang telah tercapai berupa pengembangan model konseptual, prototipe sistem, dan artikel publikasi internasional akan menjadi dasar untuk kegiatan penelitian berikutnya. Pada tahun mendatang, penelitian akan diarahkan pada uji coba prototipe di lebih banyak kelompok tani, memperluas wilayah implementasi diluar Yogyakarta, serta melakukan evaluasi efektivitas sistem dalam meningkatkan posisi tawar petani. Strategi ini bertujuan agar prototipe benar-benar sesuai dengan konteks lokal dan dapat memberikan dampak nyata pada peningkatan pendapatan petani.

Luaran wajib yang dijanjikan berupa publikasi di jurnal internasional bereputasi terindeks Scopus akan direalisasikan melalui penyusunan artikel berdasarkan hasil uji coba lapangan dan model yang diujikan dalam analisis SEM-PLS dapat lebih komprehensif. Selain itu, luaran tambahan yang direncanakan mencakup pendaftaran Hak Kekayaan Intelektual (HKI) atas prototipe sistem, penyusunan modul pelatihan literasi digital untuk petani, serta program pendampingan pada kelompok tani. Strategi pencapaian luaran dilakukan melalui kombinasi penelitian kuantitatif dan kualitatif, penguatan kolaborasi dengan pemerintah daerah, dan kemitraan dengan lembaga keuangan mikro maupun BULOG untuk mendukung keberlanjutan sistem pemasaran .

Roadmap penelitian keseluruhan disusun dalam kerangka tiga tahun. Tahun pertama (2025) berfokus pada analisis kebutuhan, studi literatur, survei lapangan, serta pengembangan model konseptual dan prototipe. Tahun kedua (2026) difokuskan pada uji coba dan validasi sistem, integrasi faktor eksternal (regulasi, literasi keuangan, dan kelembagaan), serta penyusunan publikasi internasional. Tahun ketiga (2027) diarahkan pada penyempurnaan sistem, perluasan implementasi ke wilayah lain, program pelatihan petani milenial, serta publikasi tambahan melalui seminar internasional dan prosiding. Dengan tahapan tersebut, diharapkan penelitian dapat menghasilkan model digitalisasi pertanian yang komprehensif, kontekstual, dan siap diimplementasikan secara luas. Dengan demikian, penelitian ini dapat memberikan kontribusi nyata dalam memperkuat daya saing petani padi, meningkatkan kesejahteraan, dan menciptakan sistem distribusi yang lebih efisien serta transparan di Yogyakarta.

H. DAFTAR PUSTAKA: Penyusunan Daftar Pustaka berdasarkan sistem nomor sesuai dengan urutan pengutipan. Hanya pustaka yang disitasi pada laporan kemajuan yang dicantumkan dalam Daftar Pustaka.

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Peningkatan Daya Saing Petani Padi dengan Transformasi Pemasaran Berbasis Digital Pada Kelompok Tani Unggul Yogyakarta

Enhancing the Competitiveness of Rice Farmers through Digital-Based Marketing Transformation in Unggul Farmer Groups, Yogyakarta

Universitas Budi Luhur & Universitas Gadjah Mada

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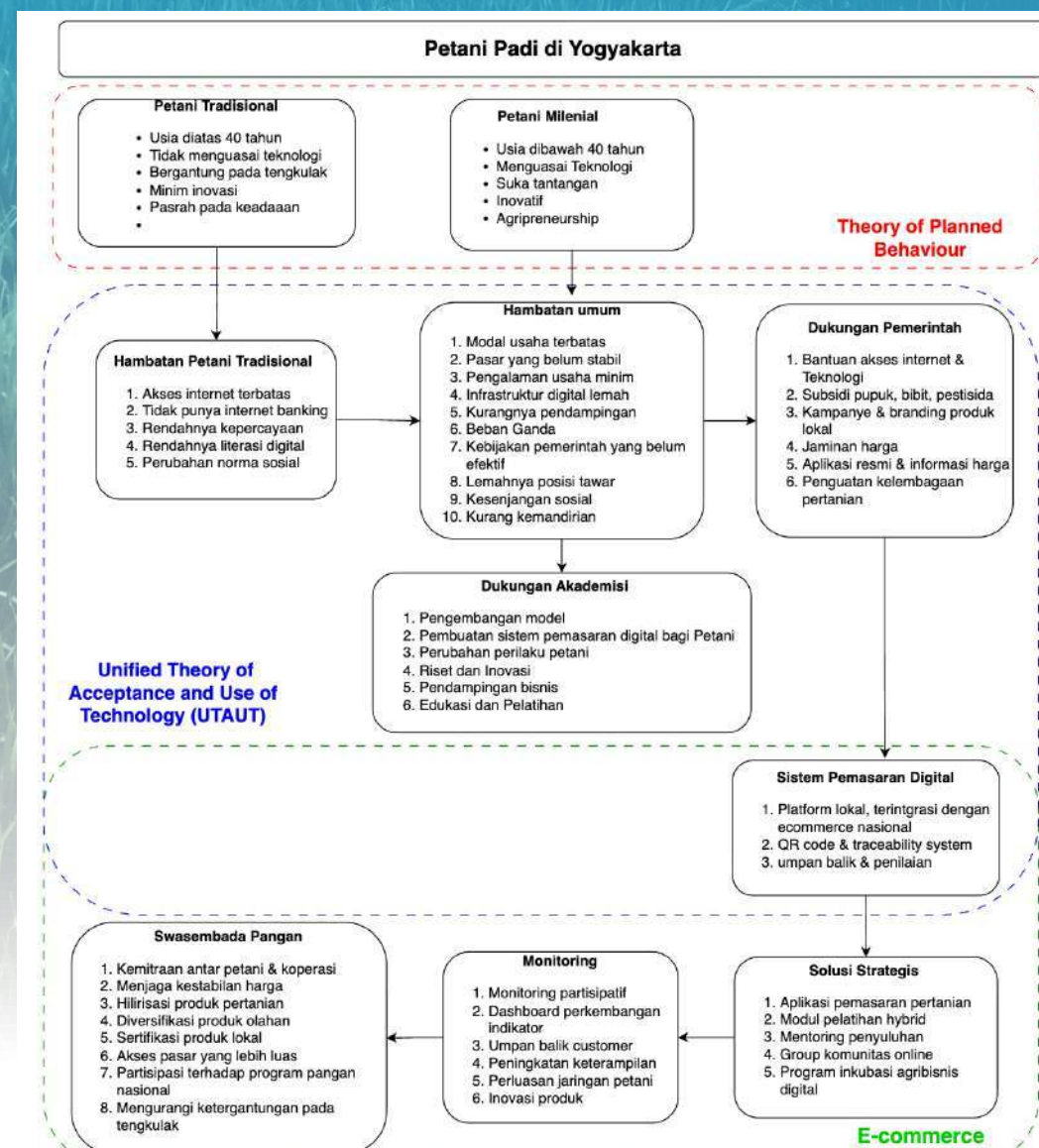
Luaran

: Artikel Internasional Scopus, HKI dan Prototype Ecommerce Petani

Kata Kunci

: Digitalisasi; Pemasaran; Petani; Padi; Penjualan

Model



Sumber: data bersumber dari FGD, Wawancara bersama Pakar, Praktisi dan Akademisi

Ringkasan Penelitian

Urgensi timbul dari sektor pertanian padi yang merupakan pilar penting bagi perekonomian Indonesia yaitu ketergantungan pada perantara, ketidakpastian pasar, dan distribusi yang tidak efisien, yang menyebabkan harga jual hasil pertanian rendah dan tidak menguntungkan. Sistem pemasaran tradisional yang bergantung pada pedagang perantara seringkali tidak mencerminkan nilai sebenarnya dari produk pertanian dan memperburuk kesejahteraan petani. Penelitian ini bertujuan untuk mengembangkan model pemasaran digital dan mengimplementasikan sistem pemasaran dengan konsep pre-order yang dapat menghubungkan petani padi langsung dengan konsumen tanpa perantara. Dengan sistem ini, petani dapat memperkirakan permintaan dan merencanakan produksi lebih efisien, mengurangi risiko kerugian akibat pembusukan hasil panen, dan mengoptimalkan harga jual melalui transparansi yang lebih baik. Selain itu, bagi konsumen, sistem ini memberikan harga yang lebih kompetitif dan jaminan kualitas produk.

Metode penelitian yang digunakan adalah research & development (R&D), yang meliputi analisis kebutuhan dan studi literatur terkait pemasaran digital dalam sektor pertanian untuk memahami tantangan serta solusi yang ada. Peneliti juga melakukan survei dan wawancara dengan petani padi untuk menggali permasalahan serta tingkat kesiapan mereka dalam mengadopsi teknologi digital. Selanjutnya dilakukan penyebaran kuesioner kepada petani di Yogyakarta untuk menguji model yang dirancang. Perancangan sistem pemasaran berbasis digital pre-order dirancang dan dikembangkan menggunakan metodologi Agile agar sistem yang dihasilkan fleksibel dan sesuai dengan kebutuhan. Luaran yang ditargetkan dari penelitian ini adalah publikasi ilmiah pada jurnal internasional bereputasi dan pengembangan model pemasaran digital berbasis ecommerce yang dapat diimplementasikan oleh petani padi. Penelitian ini juga menghasilkan desain prototipe sistem e-commerce yang fungsional. Dengan demikian, diharapkan penelitian ini dapat memberikan dampak signifikan dalam meningkatkan kesejahteraan petani padi dan menciptakan sistem distribusi pertanian yang lebih efisien dan transparan.

From Fields to Marketplaces: How Attitude Shapes E-Commerce Intentions of Farmers in Yogyakarta, Indonesia

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Abstract

This study aims to identify factors influencing rice farmers' behavioral intentions in adopting e-commerce as a means of marketing agricultural products, using an integrative model approach based on UTAUT2 and the Theory of Planned Behavior (TPB). A total of 412 rice farmer respondents in Yogyakarta were involved in a survey using a questionnaire instrument distributed through village officials in the June–July period. The study achieved a notably high valid response rate of 98%, which strengthens the methodological reliability and representativeness of the findings. Data analysis used Structural Equation Modeling Partial Least Squares (SEM–PLS). The results showed that performance expectancy, effort expectancy, social influence, and facilitating condition variables significantly influenced farmers' attitudes. In addition, attitude proved to be a significant mediator in the relationship between these four variables and behavioral intention. Meanwhile, KEB acted as a mediator that inhibited the positive influence of PE and EE on intention. However, digital literacy did not act as a significant mediator in the relationship between attitude and intention. This study provides a theoretical contribution in developing a technology adoption model in the agricultural sector and offers practical implications in strengthening agricultural digitalization policies based on local farmer characteristics.

Keywords: e-commerce, rice farmers, UTAUT2, TPB, behavioral intention, attitude, digital literacy, knowledge experience barriers.

Introduction

The agricultural sector, especially rice production, is one of the backbones of the Indonesian economy (Ahmad et al., 2024). However, rice farmers face various challenges that hinder their potential to develop (Raghu et al., 2025). These challenges include low selling prices for agricultural products due to dependence on intermediaries, market uncertainty, and inefficient distribution (F. Li et al., 2024; Yang et al., 2024). The challenges faced by rice farmers, if not addressed immediately, could hinder the achievement of one of the Millennium Development Goals (MDGs), namely reducing poverty and hunger. Statistics Indonesia data shows that if rice production is converted into rice for population food consumption, rice production throughout 2023 is estimated to be equivalent to 26.11 million tons of rice, or a decrease of 58.56 thousand tons of rice (0.22 percent) compared to 2022 which amounted to 26.17 million tons of rice (BPS, 2023). Rice productivity is closely related to the adoption of agricultural technology. A study in Yogyakarta noted that farmers who adopted superior varieties and sustainable agricultural techniques experienced an increase in income of up to 16% (Connor et al., 2021). Yogyakarta is considered a representative site for this study because it combines characteristics of both traditional and emerging digital agricultural ecosystems. The region's strong local farming networks, coupled with growing initiatives in digital literacy and online market access, make it an ideal microcosm

to observe broader trends in Indonesian agriculture. Thus, findings from Yogyakarta have the potential to inform similar contexts across other rural provinces in Indonesia.

Traditional marketing systems, where farmers rely on local markets or middlemen, often do not reflect true value and can potentially cause losses (Vahdanjoo et al., 2025). Lack of transparency in pricing and quality, as well as reliance on inefficient distribution methods, makes it difficult for rice farmers to improve their welfare (Chowdhury et al., 2022). In this global context, digital platforms and e-commerce solutions are increasingly promoted as tools to bridge the digital divide and reduce intermediary dependence. However, at the local level, particularly among smallholder farmers in Yogyakarta, digital adoption remains constrained by limited digital literacy, low trust, and uncertain economic benefits. Strengthening this link between global technological optimism and local empirical realities is crucial to understanding how behavioral attitudes shape farmers' willingness to adopt digital commerce solutions (Lestari et al., 2024; Qadir et al., 2024).

Despite the growing body of research on digital marketing in agriculture (Pesci et al., 2023; Qing & Chen, 2024), a key research gap exists in understanding the role of farmers' attitudes in shaping their behavioral intentions to adopt e-commerce particularly in rural, rice-farming communities in Indonesia. Many existing studies focus primarily on technical adoption factors, infrastructure availability, or consumer side dynamics (Choruma et al., 2024; Cimino et al., 2024), but there is limited empirical investigation into how farmers' perceptions, digital literacy, and knowledge barriers influence their readiness to engage in pre-order-based e-commerce systems (Li et al., 2024; Zhong et al., 2024). Moreover, while the pre-order model has been studied in other sectors, its application in rural rice farming remains underexplored and lacks robust empirical testing in the Indonesian context (Shobur et al., 2025; Y. Wang et al., 2024).

Therefore, this study aims to develop and empirically validate a conceptual model of e-commerce adoption among rice farmers in Yogyakarta, Indonesia, using the pre-order system. Within the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) framework, this study focuses specifically on attitude as the key construct. While other UTAUT2 dimensions such as performance expectancy, effort expectancy, and facilitating conditions are important, attitude provides a more comprehensive lens to explain farmers' evaluative judgments toward technology. Prior research suggests that attitude can capture emotional readiness, perceived relevance, and perceived social value, making it a decisive factor in determining behavioral intention in rural agricultural contexts.

Given the unique digital transformation challenges faced by rice farmers in Yogyakarta, this study aims to explore how their attitudes and perceptions shape the adoption of digital platforms for agricultural marketing. To guide this investigation, the following research questions are proposed.

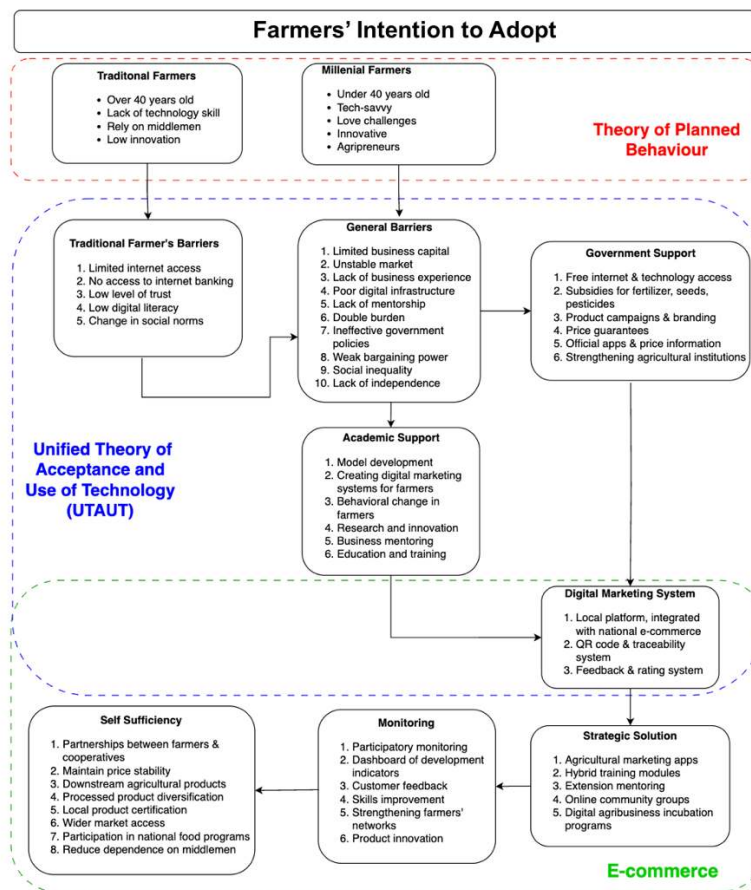
1. How does farmers' attitude influence their intention to adopt e-commerce platforms for rice marketing in Yogyakarta?
2. How do facilitating conditions, performance expectancy, and social influence affect attitude and behavioral intention?
3. Does access to finance or digital literacy moderate the relationship between attitude and behavioral intention?
4. What are the key determinants of farmers' technology adoption behavior in the agricultural sector based on the UTAUT2 model?

Literature Review

For rice farmers in Yogyakarta, the application of the TPB can explain the psychological processes underlying their intention to adopt e-commerce as a crop marketing strategy. Farmers' attitudes toward digital technology play a crucial role in shaping these intentions. If farmers believe that using e-commerce will provide benefits such as increased market access, better selling prices, and time efficiency, their attitudes will tend to be positive. This attitude is an initial determinant of their readiness to try and use digital platforms (Oktaviani, 2025).

To strengthen the technological dimension in analyzing e-commerce adoption behavior by rice farmers, this study adopted the Unified Theory of Acceptance and Use of Technology (UTAUT) framework developed by Venkatesh et al. (2003), and later refined into UTAUT2 by Venkatesh, Thong, and Xu (2012). This theory was used because it has a high predictive capacity in explaining the intention and behavior of using information technology in the agricultural sector. Farmers will tend to adopt e-commerce technology if they perceive that using digital platforms will increase their sales results, and if the system is easy to use. Support from fellow farmers, farmer groups, and field extension workers can also strengthen the intention to try a new system. In addition, the availability of internet networks, training, and technological devices is a crucial factor in driving successful adoption.

Previous research provides empirical support for the validity of this theory in the agricultural sector. (Kabir et al., 2020) found that performance expectancy and effort expectancy is an important determinant in the adoption of mobile banking by farmers in Bangladesh, which can be applied in parallel in the context of e-commerce. (Maina et al., 2023), in a study in Kenya, also showed that social influence and facilitating conditions significantly encourage farmers to use digital information systems in marketing agricultural products.



Source: FGD Local government, experts, practitioners, 2025
Figure 1. Theoretical Framework

This digital marketing model for rice farmers in Yogyakarta was developed based on the results of a Focus Group Discussion (FGD) involving various stakeholders, including local government, academics, agricultural experts, practitioners, and farmer representatives. This model aims to address the digital transformation challenges faced by farmers and support the achievement of technology-based food independence and self-sufficiency. Initially, the model maps farmers into two main groups: traditional farmers and millennial farmers. Traditional farmers are generally over 40 years old, lack technological expertise, rely on middlemen, and exhibit minimal innovation. Meanwhile, millennial farmers, who are under 40, tend to be more adaptable to technology, enjoy challenges, and are innovative. This segmentation is important because it determines different intervention approaches in training and digitalization strategies.

Each group faces distinct obstacles. Traditional farmers often experience limited internet access, low digital literacy, and minimal trust in technology systems (Larasati et al., 2024). Conversely, all farmers share challenges such as limited business capital, unstable markets, weak infrastructure, and lack of mentorship. To address these issues, the model highlights the crucial role of government and academia where the government provides infrastructure, subsidies, and market access initiatives, while academics design digital system models and deliver mentoring through research based community engagement (Oktaviani, 2024). During field data collection, village officials and agricultural facilitators were involved in assisting farmers with questionnaire

completion to ensure comprehension. However, this approach may introduce potential interviewer bias, as respondents might adjust their answers to align with perceived authority expectations. Therefore, data validation and triangulation methods were applied to minimize such bias and maintain response reliability.

The implementation of this model materializes through the development of a locally rooted digital marketing system integrated with national e-commerce platforms, featuring QR code and traceability functions to enhance consumer trust. The system includes customer feedback and rating mechanisms, complemented by hybrid training modules, mentoring by field officers, and digital agribusiness incubation programs. Sustainability is ensured through continuous monitoring and evaluation using real-time farmer participation and customer feedback data. The ultimate goal is to foster food independence and agricultural self-sufficiency through cooperative partnerships, product diversification and certification, broader market access, and inclusion in national food programs. This study develops a conceptual model to examine the determinants of farmers' intention to adopt e-commerce. The model extends UTAUT2 by emphasizing attitude as the central mediator, while incorporating knowledge experience barriers and digital literacy as contextual factors reflecting farmers' readiness and capability.

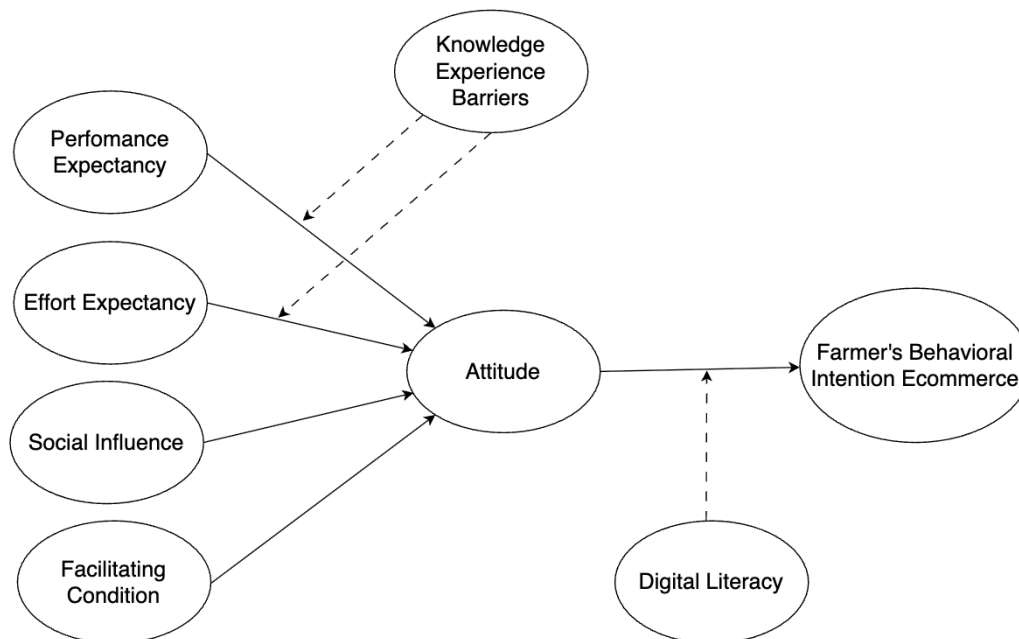


Figure 2. Research Model

With this approach, the developed research model not only addresses the functional aspects of UTAUT, but also enriches the psychological aspects and individual capacity of farmers through the integration of attitude, knowledge barriers, and digital literacy variables. The results of this model are expected to provide a more holistic picture in explaining the dynamics of rice farmers' behavior towards the adoption of digital marketing systems in the era of agricultural transformation 4.0. The conceptual model derived from theoretical integration and FGD results focuses on understanding why some rice farmers are willing or reluctant to use digital platforms for marketing. Farmers' behavioral intentions serve as the dependent variable, influenced primarily

by attitude, which captures their evaluations of e-commerce benefits, ease of use, and value (Fidowaty & Supriadi, 2020). Attitude has consistently been shown as a strong predictor of behavioral intention (Ajzen, 1991; Raghu et al., 2025)

Additionally, the Knowledge Experience Barriers variable was included, representing farmers' subjective barriers related to their lack of knowledge and experience with digital technology. These barriers are considered capable of lowering effort and performance expectancy, which ultimately influences attitude formation. A study by (Ye et al., 2024) found that knowledge barriers were a major barrier to the adoption of smart agricultural technologies, particularly among older farmers or those with low levels of education. Therefore, this variable in the model acts as an exogenous variable influencing the factors that shape attitudes.

Furthermore, digital literacy plays a significant role as an additional predictor of farmer attitudes. Farmers with higher levels of digital literacy tend to have a better perception of technology and feel more confident in using it. Digital literacy has been shown to be a crucial factor in reducing fear of technology and increasing confidence in using e-commerce applications, as evidenced by studies (Yeşilyurt & Vezne, 2023). Therefore, digital literacy in this model directly influences attitudes, which in turn drives intentions.

Performance Expectancy (PE)

PE is defined as the degree to which an individual believes that using a system or technology will improve their performance (Venkatesh et al., 2003). In this study, farmers described the extent to which they believed that using e-commerce would provide tangible benefits such as reaching a wider market, increasing income, or reducing dependence on middlemen. When farmers perceive that using e-commerce will actually increase their sales or profits, they will develop a positive attitude toward the technology. Research by (Chen et al., 2024) shows that PE has a significant influence on individual attitudes towards banking technology and other digital applications. In the agricultural sector, (Otter & Deutsch, 2023) found that perceived benefits from using agricultural information technology increased farmers' positive attitudes toward digital systems, thereby strengthening their intention to use them. This demonstrates that PE can shape affective beliefs that underlie individual attitudes toward technology adoption.

H1: PE has a significant influence on Attitude

Effort Expectancy (EE)

EE is defined as the extent to which a person believes that using a technology system will be easy and will not require significant effort (Venkatesh et al., 2003). In this study, EE represents their perception of the ease of use of an e-commerce platform, whether the application is easy to understand, not confusing, and does not require high technical skills. Research by (Xu et al., 2024) shows that EE has a significant influence on attitude in the context of mobile banking adoption. In agriculture, (Xiang & Guo, 2023) research has shown that farmers who perceive agricultural technology systems as easy to learn and use are more open to them. Therefore, perceptions of ease play a significant role in fostering positive attitudes toward e-commerce as a means of marketing agricultural products.

H2: EE has a significant influence on Attitude

Social Influence (SI)

Social Influence (SI) is defined as the extent to which an individual perceives that important people in their life, such as family, friends, coworkers, group leaders, or community leaders,

believe they should use a technology (Venkatesh et al., 2003). In this study, SI refers to the extent to which farmer groups, agricultural extension workers, traditional leaders, or fellow farmers influence their views and decisions regarding e-commerce use. When farmers perceive that their community supports or even begins to adopt e-commerce, their attitudes toward this technology will become more open and positive. In developing UTAUT, Venkatesh et al. (2003) also noted that social influence significantly influences technology adoption, especially in the early stages, and indirectly shapes attitudes. (Bhatt, 2024) shows that in the digitalization of farmers, social influence from colleagues and work partners has a significant impact on perceptions and attitudes towards new technologies.

H3: SI has a significant influence on Attitude

Facilitating Condition (FC)

Facilitating Condition (FC) refers to an individual's perception of the availability of infrastructure, resources, and technical support that facilitate their use of a particular technology (Venkatesh et al., 2003). In this study, FC can include the availability of an internet connection, access to technological devices (smartphones, computers), assistance from agricultural extension workers, digital training, and support from the government and financial institutions. When farmers perceive that there is sufficient support to help them learn and use technology, they will be more open and have a positive attitude toward that technology. In agriculture, (Methamontri et al., 2022) emphasized that the existence of digital training, technology extension workers, and mentoring programs contributed to increasing farmers' positive attitudes towards the use of digital-based marketing technology.

H4: FC has a significant influence on Attitude

Attitude

In this study, attitude toward e-commerce use is used as a mediating variable that bridges the relationship between several exogenous factors with farmers' behavioral intentions in adopting digital marketing systems. The use of attitude as a mediator is based on the Theory of Planned Behavior (Ajzen, 1991), which states that attitude is the main determinant that shapes a person's behavioral intention towards an action. In this study, the attitude variable is used as a mediating variable that bridges the influence of several main factors on farmers' behavioral intentions to adopt e-commerce. In other words, farmers' perceptions of benefits, convenience, social influence, and availability of facilities not only have a direct impact, but also indirectly through pre-formed attitudes. Farmers' attitudes are a crucial point that converts initial perceptions into concrete behavioral intentions in the context of digital marketing adoption.

H5: Attitude has a significant influence on Farmers Behavioral Intention Ecommerce

Attitude has been widely recognized as a crucial mediating variable in technology adoption models, particularly in the agricultural sector. (Otter & Deutsch, 2023) demonstrated that performance expectancy significantly affects farmers' behavioral intentions through their attitudes, showing that perceived benefits influence adoption only when accompanied by positive attitudes. (Xu et al., 2024) found that the ease of using digital platforms leads to stronger behavioral intentions when users have already developed a favorable attitude toward the system. (Bhatt, 2024) emphasized that social influence affects behavioral intention indirectly via attitude, as farmers are more inclined to adopt technology when trusted peers shape a supportive mindset. Lastly, (Methamontri et al., 2022) found that the availability of facilitating conditions such as training and

infrastructure does not directly drive behavioral intention unless it first cultivates a positive attitude, underscoring the mediating role of attitude in bridging external support and farmers' willingness to engage in e-commerce.

H6: Attitude can mediate the influence of PE on Farmers' Behavioral Intention of Ecommerce

H7: Attitude can mediate the influence of EE on Farmers' Behavioral Intention of Ecommerce

H8: Attitude can mediate the influence of SI on Farmers' Behavioral Intention of Ecommerce

H9: Attitude can mediate the influence of FC on Farmers' Behavioral Intention of Ecommerce

Knowledge Experience Barriers (KEB)

PE refers to the degree to which an individual believes that using a system will help them attain gains in performance (Venkatesh et al., 2003). In the context of farmers, PE reflects their expectations regarding the tangible benefits of using e-commerce platforms, such as reaching broader markets, increasing profitability, and reducing reliance on middlemen. However, the positive perception of these benefits does not always translate into favorable attitudes if users face cognitive or experiential limitations. KEB represent the constraints that arise due to limited knowledge, technical experience, or confidence in using digital technologies (Xiao et al., 2024). Even when farmers believe that e-commerce is beneficial, they may still form negative or hesitant attitudes toward it if they feel unprepared or lack experience with the technology. Studies have shown that technological optimism alone is insufficient in contexts where digital readiness is low. (Doanh et al., 2022) found that in Vietnam, perceived benefits of smart agriculture tools did not significantly lead to adoption intentions when knowledge and experience barriers were present. Similarly, (Zhao et al., 2025) emphasized that cognitive gaps can attenuate the relationship between perceived usefulness and user attitudes, particularly among novice or rural users.

H10: KEB can moderate the influence of PE on attitude

EE is defined as the degree of ease associated with the use of a particular system (Venkatesh et al., 2003). In the context of rice farmers adopting e-commerce, EE represents their perception that the digital platform is simple, easy to understand, and does not require advanced technical skills. However, the perceived ease of use alone may not be sufficient to foster positive attitudes if farmers lack prior exposure to or experience with digital tools. This is where KEB come into play. KEB reflect internal constraints such as limited digital skills, lack of hands-on experience, or low confidence in engaging with technology (Xiao et al., 2024). When these barriers are high, even technologies perceived as easy to use may still seem intimidating, leading to lower attitude formation. Doanh et al. (2022) argue that knowledge and experiential gaps hinder the translation of positive perceptions into favorable attitudes, especially in rural populations. (Lestari et al., 2020) also found that when digital knowledge is limited, the impact of effort expectancy on technology acceptance is significantly weakened, highlighting the importance of prior familiarity in shaping attitudes.

H11: KEB can moderate the influence of EE on attitude

Digital Literacy (DL)

DL refers to an individual's ability to access, understand, evaluate, and use information and communication technologies effectively (Ng, 2012). In this study, digital literacy encompasses the ability to use a smartphone, navigate e-commerce applications, understand digital transactions, and independently manage information on digital platforms. Although farmers have positive attitudes toward e-commerce, their intention to actually use it is greatly influenced by their level of digital

literacy (Oktaviani, 2024). A positive attitude alone is not enough without the skills to operate technology independently. Research by (Yeşilyurt & Vezne, 2023), studies show that digital literacy is a key prerequisite for positive attitudes toward technology to translate into real-world behavior. In the study, users who had positive attitudes toward smartphones but lacked adequate digital literacy tended to use them less optimally.

H12: DL can moderate the influence of Attitude on Farmers' Behavioral Intention of Ecommerce

Methods

This study uses a quantitative approach with a survey method to measure the influence of various factors on farmers' behavioral intentions to adopt e-commerce, particularly among rice farmers in the Yogyakarta region. This study was designed as an explanatory study to test the causal relationship between variables in a theoretical model developed based on the integration of TPB and UTAUT2. The population in this study was all rice farmers in the Special Region of Yogyakarta (DIY) Province. However, the exact population size is unknown because official data on the number of active farmers specifically per region is not available in aggregate. Therefore, the researcher used a non-probability sampling technique, more precisely purposive sampling, which is the selection of respondents based on certain predetermined criteria (Hair et al., 2019).

The inclusion criteria in sample selection included: (1) active farmers who still routinely cultivate rice, (2) domiciled in the Yogyakarta area, and (3) willing to participate in the survey and receive assistance in filling out the questionnaire. To maximize data accessibility and relevance, the questionnaire was distributed directly through village officials who had coordinated with farmer groups and field extension workers in each region namely Bantul District, Gunungkidul, Kulon Progo District, and Sleman District. Farmers were guided in the questionnaire filling process to ensure understanding of each statement item. Based on Hair et al.'s (2010) criteria for SEM-PLS where the model has ≥ 6 constructs, ≥ 20 indicators, or ≥ 15 paths, the recommended $n \geq 300$. Of the total 420 questionnaires successfully distributed during the period of June to July, 412 questionnaires were declared valid and could be used in the analysis. Although stratification was not applied in the sampling frame, descriptive balancing was observed between age and education groups to ensure proportional representation of both traditional (≥ 40 years old) and millennial (< 40 years old) farmers across the four districts.

Data were analyzed using the Structural Equation Modeling with Partial Least Squares (SEM-PLS) approach, as this method is suitable for testing complex theoretical models, involving many latent constructs, and does not require a multivariate normal distribution. Furthermore, SEM-PLS is also suitable for research with predictive objectives and for data collected through an ordinal Likert scale. The analysis was conducted using SmartPLS 4.0 software, with the analysis stages including testing the measurement model and the structural model.

Table 1. presents a detailed overview of the demographic and socio-economic characteristics of the respondents who participated in this study. Based on the demographic characteristics of 412 valid respondents, the majority were male (86%), while female respondents accounted for 14%. In terms of age, the highest proportion was in the 55–80 age group (57%), followed by 40–54 years (34%), with younger farmers (30–39 years and 22–29 years) comprising 9% in total. Regarding education, 57% had completed high school or its equivalent, while 24% had elementary education, and 16% had junior high school education. Only a small portion had higher education, with 2% holding a bachelor's degree and 1% holding a diploma. As for sales targets, 56% of farmers sold their crops to middlemen, 37% to market traders, and 7% primarily for personal consumption.

Table 1. Description of respondents

Statistical Characteristics	Category	Frequency	Valid Percentage
Gender	Man	355	86%
	Female	57	14%
Age	22-29	4	1%
	30-39	32	8%
	40-54	140	34%
	55-80	236	57%
Education	Elementary school	97	24%
	Junior high school (equivalent)	65	16%
	High school (equivalent)	235	57%
	Diploma (equivalent)	5	1%
	Bachelor degree	10	2%
Sales target	middleman	230	56%
	Market traders	153	37%
	Personal Consumption	29	7%

Research Results

This study used a likert scale of 1 to 5 to measure eight variables, each consisting of four valid questionnaire items. The variables include Knowledge Experience Barriers (KEB), Digital Literacy (DL), Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Attitude (A), and Intention to Adopt (IA). The highest average score was for KEB (3.57), showing that knowledge and experience gaps are still perceived by farmers. DL and PE followed with a mean of 3.39, reflecting moderate confidence in digital skills and expected benefits from e-commerce. Other variables such as EE, SI, FC, A, and IA had mean scores ranging from 3.11 to 3.23, indicating relatively positive perceptions but with room for improvement, especially in terms of support and ease of use.

Table 2. Statistic Descriptive

Variable	N	SUM	Min	Max	Average	Std Dev.
KEB	412	5876	1	5	3.57	3.84
DL	412	5588	1	5	3.39	3.93
PE	412	5588	1	5	3.39	3.93
EE	412	5166	1	5	3.13	3.67
SI	412	5191	1	5	3.15	3.35
FC	412	5132	1	5	3.11	3.54
A	412	5330	1	5	3.23	3.52
IA	412	5160	1	5	3.13	3.66

The results of the correlation analysis in Table 3 show that all variables have significant Pearson correlation values at either the 0.05 or 0.01 significance levels (2-tailed). This indicates a statistically meaningful relationship among the constructs in the study model. Although the strength of the correlations varies, ranging from weak to strong, the overall significance suggests that each variable is related to others in a consistent and theoretically expected manner. Attitude (A) and Intention to Adopt (IA) have the strongest correlation ($r = 0.820$, $p < 0.001$), highlighting a strong link between the psychological predisposition of farmers and their actual behavioral intention. The significance of all correlations confirms that the variables are interrelated and relevant for further structural analysis in testing the proposed research model.

Table 3. Correlations

		KEB	DL	PE	EE	SI	FC	A	IA
KEB	Pearson Correlation	1	.125*	.125*	.107*	.060	.034	.115*	.084
	Sig. (2-tailed)		.011	.011	.029	.024	.009	.019	.030
DL	Pearson Correlation	.125*	1	1.000**	.625**	.488**	.715**	.649**	.591**
	Sig. (2-tailed)	.011		<.001	<.001	<.001	<.001	<.001	<.001
PE	Pearson Correlation	.125*	1.000**	1	.625**	.488**	.715**	.649**	.591**
	Sig. (2-tailed)	.011	<.001		<.001	<.001	<.001	<.001	<.001
EE	Pearson Correlation	.107*	.625**	.625**	1	.659**	.618**	.724**	.735**
	Sig. (2-tailed)	.029	<.001	<.001		<.001	<.001	<.001	<.001
SI	Pearson Correlation	.060	.488**	.488**	.659**	1	.591**	.649**	.716**
	Sig. (2-tailed)	.024	<.001	<.001	<.001		<.001	<.001	<.001
FC	Pearson Correlation	.034	.715**	.715**	.618**	.591**	1	.688**	.677**
	Sig. (2-tailed)	.009	<.001	<.001	<.001	<.001		<.001	<.001
A	Pearson Correlation	.115*	.649**	.649**	.724**	.649**	.688**	1	.820**
	Sig. (2-tailed)	.019	<.001	<.001	<.001	<.001	<.001		<.001
IA	Pearson Correlation	.084	.591**	.591**	.735**	.716**	.677**	.820**	1
	Sig. (2-tailed)	.030	<.001	<.001	<.001	<.001	<.001	<.001	

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

The results of the outer model test indicate that all indicators in the questionnaire items meet the convergent validity threshold with a loading factor value of ≥ 0.70 . Therefore, each indicator is declared valid and able to reflect the research variable construct representatively.

Table 4. Outer Loading Test

Variables	Items	Outer Loading
Attitude (Pezzini et al., 2023)	I enjoy selling rice online.	0.908
	I believe digital marketing is beneficial for my business.	0.931
	I feel comfortable offering rice over the internet.	0.918
	I am enthusiastic about learning how to do digital marketing.	0.906
Digital Literacy (Ng, 2012)	I can use my cell phone to access the internet.	0.927
	I am able to open and operate applications on my cellphone.	0.949
	I can send messages via applications such as WhatsApp.	0.929
	I can upload photos to online shopping apps.	0.862
Effort Expectancy (Nafar et al., 2025)	I find the online buying and selling application easy to use.	0.911
	I feel like I quickly learned how to sell rice online.	0.952
	I had no trouble understanding how to set prices in the app.	0.939
	I find the menus in the buying and selling app easy to follow.	0.922
Facilitating Condition (Ye et al., 2024)	I have a cellphone that supports the use of buying and selling applications.	0.884
	The internet signal in my rice field is good enough to access the application.	0.845
	I once received training on how to sell online.	0.701
	I have a bank account to receive digital payments.	0.835
Farmers Intention to Adoption (J. Wang et al., 2023)	I plan to start selling rice through digital platforms.	0.945
	I intend to create an ecommerce account in the near future.	0.958
	I will try to promote my rice online.	0.939
	I will make ecommerce the main way to sell rice.	0.929
Knowledge Experience Barriers (Doanh et al., 2022)	I don't understand how to offer my rice through online applications.	0.903
	I have never tried selling crops over the internet.	0.938
	I don't know how to display my rice photos on digital platforms.	0.933
	I have difficulty understanding the terms in online buying and selling applications.	0.901
Performance Expectancy (Yeşilyurt & Vezne, 2023)	I believe selling rice online will increase my profits.	0.880
	I believe there will be more buyers if my rice is sold online.	0.940
	I believe online sales are faster than the usual way.	0.918
	I believe my income will be more stable with digital marketing.	0.901
Social Influence (Rajendran et al., 2025)	My family encouraged me to try selling online.	0.906
	My farmer friend suggested selling rice online.	0.913
	My farmer group supports me in using ecommerce.	0.904
	My neighbor has started selling his crops online.	0.808

Average Variance Extracted (AVE) is a method used to assess construct validity in confirmatory factor analysis (CFA) and structural equation modeling (SEM). AVE reflects the extent to which a construct is able to explain the variance of its constituent indicators. Based on the test results, all construct variables in this study performance expectancy, effort expectancy, facilitating condition, social influence, attitude, farmers' intention to adopt, digital literacy, and knowledge experience barriers had AVE values above 0.60. This indicates that the indicators used adequately represent the construct and support the accuracy of the statistical analysis.

Table 5. Reliability and Validity Test

Variable	Cronbach's alpha	Composite reliability	AVE
Attitude	0.936	0.936	0.839
Digital Literacy	0.937	0.937	0.842
Effort Expectancy	0.949	0.949	0.867
Facilitating Condition	0.835	0.850	0.671
Farmers Intention to Adoption	0.958	0.959	0.889
Knowledge Experience Barriers	0.939	0.962	0.844
Performance Expectancy	0.931	0.931	0.828
Social Influence	0.906	0.909	0.781

Heterotrait-Monotrait Ratio (HTMT) is one approach used to test the discriminant validity between constructs in CFA and SEM. Based on the test results, all constructs in this study including performance expectancy, effort expectancy, Facilitating condition, social influence, attitude, farmers' intention to adopt, digital literacy and knowledge experience bars showed HTMT values that met the criteria, so it can be concluded that each construct has good discriminant validity and can be clearly distinguished from one another.

Table 6. Heterotrait-Monotrait Ratio (HTMT) Test

	HTMT
Digital Literacy <-> Attitude	0.693
Effort Expectancy <-> Attitude	0.768
Effort Expectancy <-> Digital Literacy	0.663
Facilitating Condition <-> Attitude	0.778
Facilitating Conditions <-> Digital Literacy	0.807
Facilitating Condition <-> Effort Expectancy	0.694
Farmers Intention to Adoption <-> Attitude	0.865
Farmers Intention to Adopt <-> Digital Literacy	0.623
Farmers Intention to Adoption <-> Effort Expectancy	0.771
Farmers Intention to Adoption <-> Facilitating Conditions	0.757
Knowledge Experience Barriers <-> Attitude	0.123
Knowledge Experience Barriers <-> Digital Literacy	0.134
Knowledge Experience Barriers <-> Effort Expectancy	0.114
Performance Expectancy <-> Attitude	0.793
Performance Expectancy <-> Digital Literacy	0.677
Performance Expectancy <-> Effort Expectancy	0.841

Performance Expectancy <-> Facilitating Condition	0.702
Social Influence <-> Attitude	0.705
Social Influence <-> Digital Literacy	0.530
Social Influence <-> Effort Expectancy	0.711
Social Influence <-> Facilitating Conditions	0.682
Social Influence <-> Knowledge Experience Barriers	0.065

The results of the determination test are shown through the adjusted R square value of 0.672, meaning that the attitude reputation by performance expectancy, effort expectancy, Facilitating conditions, social influence of 67.2% while the adjusted R square value is 0.676, meaning farmers' intention to adopt influenced by performance expectancy, effort expectancy, Facilitating conditions, social influence, attitude by 67.6%.

Table 7. R Square

	R-square	R-square adjusted
Attitude	0.678	0.672
Farmers Intention to Adoption	0.679	0.676

Hypothesis testing is a statistical process used to decide whether to accept or reject a statistical hypothesis based on empirical evidence gathered from data.

Table 8. Hypothesis Testing

Variables	STDEV	P values	Hypothesis
Performance Expectancy -> Attitude	0.085	0.003	H1 accepted
Effort Expectancy -> Attitude	0.064	0.000	H2 accepted
Social Influence -> Attitude	0.069	0.026	H3 accepted
Facilitating Condition -> Attitude	0.059	0.000	H4 accepted
Attitude -> Farmers Intention to Adoption	0.060	0.000	H5 accepted
Performance Expectancy -> Attitude -> Farmers Intention to Adoption	0.058	0.001	H6 accepted
Effort Expectancy -> Attitude -> Farmers Intention to Adoption	0.053	0.000	H7 accepted
Facilitating Condition -> Attitude -> Farmers Intention to Adoption	0.051	0.000	H8 accepted
Social Influence -> Attitude -> Farmers Intention to Adoption	0.057	0.042	H9 accepted
Knowledge Experience Barriers x Performance Expectancy -> Attitude	0.050	0.010	H10 accepted
Knowledge Experience Barriers x Effort Expectancy -> Attitude	0.056	0.004	H11 accepted
Digital Literacy x Attitude -> Farmers Intention to Adoption	0.019	0.253	H12 Rejected

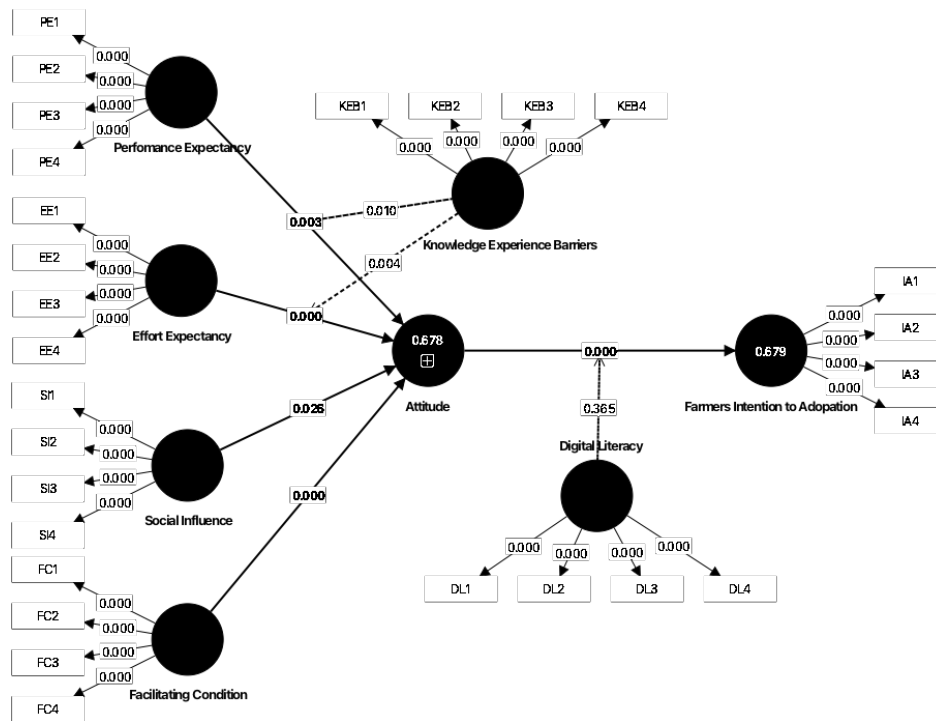


Figure 3. Research result

Based on the results of hypothesis testing, all direct relationships between exogenous variables and endogenous variables in the research model showed significant results ($p < 0.05$), indicating that hypotheses H1 through H5 are accepted. This means that performance expectancy, effort expectancy, social influence, and facilitating condition significantly influence farmers' attitudes, and that attitude itself significantly influences farmers' behavioral intention to adopt e-commerce. For the mediation effects (H6 to H9), attitude was found to significantly mediate the relationship between performance expectancy, effort expectancy, social influence, and facilitating condition toward farmers' intention to adopt e-commerce. This confirms that attitude acts as a key mechanism through which these factors shape behavioral intention. In the moderation analysis, Knowledge Experience Barriers (KEB) were found to significantly moderate the relationship between performance expectancy and intention (H10), as well as between effort expectancy and attitude (H11), suggesting that limited knowledge and experience can weaken or enhance the effects of perceived usefulness and ease of use. However, the interaction between Digital Literacy and Attitude on farmers' behavioral intention (H12) was not significant ($p = 0.365 > 0.05$), thus the hypothesis was rejected. This suggests that even though farmers may have a positive attitude toward e-commerce, insufficient digital literacy may hinder their actual adoption behavior. Overall, these findings support the proposed theoretical framework, particularly highlighting the critical role of attitude as both a direct and mediating factor, and the nuanced impact of barriers and literacy in moderating farmers' readiness to adopt digital marketing platforms.

Discussion

Performance Expectancy

The findings of this research reveal that PE significantly affects both farmers' attitudes and their intentions to adopt e-commerce. This result supports the notion that the more farmers perceive e-commerce as beneficial such as by expanding market reach, boosting earnings, and lessening

reliance on intermediaries the more likely they are to develop favorable attitudes and intentions toward using it in marketing their agricultural products. Conceptually, PE refers to an individual's belief that utilizing a particular system will enhance their performance (Venkatesh et al., 2003). In the context of rice farming, PE represents farmers' expectations for improved efficiency and profitability through digital platforms. These results align with Chen et al. (2024), who found that PE significantly shaped user attitudes toward digital technologies, particularly in the financial sector. Similarly, Otter and Deutsch (2023) found that farmers' recognition of the advantages offered by agricultural information systems promoted positive attitudes and directly encouraged their sustained use of digital solutions in the farming sector.

Furthermore, this research aligns with the UTAUT2 theory (Venkatesh et al., 2012), which asserts that PE is a strong construct in predicting behavioral intention, including in the context of e-commerce adoption. Comparable results have also been found in other Southeast Asian agricultural contexts, such as Nguyen et al. (2023) in Vietnam and Rahman et al. (2024) in Malaysia, where farmers' perceived usefulness of online markets significantly influenced adoption intention. These regional parallels suggest that perceived technological benefits remain a universal driver across ASEAN rural communities. Therefore, the evidence indicates that farmers' belief in the tangible benefits of e-commerce not only shapes positive attitudes but also acts as a key determinant of behavioral adoption intentions. From a policy standpoint, local governments could translate this finding into action by designing incentive schemes such as guaranteed market linkages or promotional subsidies for farmers who adopt e-commerce, thereby reinforcing perceived benefits through tangible economic rewards.

Effort Expectancy

The results of this study indicate that EE has a significant influence on rice farmers' attitudes and behavioral intentions in adopting e-commerce. This finding indicates that farmers' perceptions of the ease of use of digital platforms significantly encourage the formation of positive attitudes toward technology, which ultimately has implications for increasing their intention to use e-commerce as a means of marketing their crops. In this context, EE reflects farmers' beliefs that e-commerce systems are easy to use, not confusing, and do not require high technical skills. When technology is perceived as uncomplicated, farmers tend to be more open to trying it, even without prior digital experience. This finding aligns with the study by Xu et al. (2024), which demonstrated that EE significantly influences user attitudes toward mobile banking adoption. In the agricultural sector, Xiang and Guo (2023) also found that farmers who perceived technology as easy to understand exhibited more positive attitudes toward its use. In other words, perceived ease of use is an affective-cognitive factor that plays a crucial role in shaping the acceptance of new technologies among farmers.

Parallel findings from Southeast Asian contexts, such as Srisawasdi et al. (2023) in Thailand, also highlight that user friendly digital interfaces and local language training significantly increase adoption readiness among rural farmers. These cross-country comparisons emphasize that usability and accessibility are not only cognitive but also contextual issues influenced by infrastructure and education levels. Hence, this study suggests not proves that enhancing system simplicity and localized user design can foster greater inclusion of older or less educated farmers. Policy implications include the development of simplified e-commerce training curricula by

agricultural extension offices, along with the provision of demo kiosks or digital literacy caravans to simulate real transactions. This approach operationalizes the importance of perceived ease of use into direct capacity building programs.

Social Influence

The results of this study indicate that SI has a significant influence on the attitudes and behavioral intentions of rice farmers in adopting e-commerce. This finding confirms that social encouragement or support from the surrounding environment, such as farmer groups, agricultural extension workers, community leaders, and fellow farmers, plays a significant role in shaping farmers' positive attitudes towards the use of digital technology. When farmers see that their surrounding community is starting to adopt technology or provide support for e-commerce, they tend to be more open and accept the technology as a solution in marketing agricultural products. In the context of UTAUT theory, Venkatesh et al. (2003) have emphasized that SI is very influential in the early stages of technology adoption, because individuals tend to adjust their behavior based on perceptions of dominant social expectations. This research aligns with Bhatt's (2024) findings, which show that in the process of agricultural digitalization, social influence from colleagues and business partners significantly contributes to the formation of farmers' positive attitudes toward new technologies. In agrarian communities like Yogyakarta, where farmer decisions are often collective and based on community trust, SI is a key factor influencing innovation acceptance. Supportive social norms, such as testimonials from other farmers who have successfully used e-commerce, and encouragement from field extension workers, contribute to positive attitudes toward technology.

Furthermore, the results of this study also confirm that SI has a significant direct influence on farmers' behavioral intention to use e-commerce. This means that community support not only shapes attitudes but also drives actual behavioral intentions. This is consistent with the study by Rajendran et al. (2025), which found that social influence from farmer groups and extension workers plays a significant role in increasing farmers' intention to access digital markets. This form of social support, whether in the form of invitations, group training, or sharing successful experiences, serves to strengthen farmers' self-confidence and reduce hesitation in adopting digital technology. Thus, social influence is proven to be a key determinant in the e-commerce adoption model among rice farmers.

Facilitating Condition

The results of this study revealed that FC has a significant influence on rice farmers' attitudes and behavioral intentions to adopt e-commerce. FC in this context reflects farmers' perceptions of the availability of adequate external support, such as internet networks, technological devices (smartphones, computers), digital training, guidance from agricultural extension workers, and government programs and financial institutions that support agricultural digitalization. When farmers perceive they have access to sufficient resources and technical assistance, they tend to develop positive attitudes toward the use of digital technology in agricultural marketing activities. These findings align with the study by Methamontri et al. (2022), which showed that digital training, the provision of technology extension workers, and mentoring programs can increase farmers' positive attitudes toward the use of information technology in agriculture. The availability of these external facilities and support not only provides a sense of security but also fosters the perception that technology can be used efficiently, even for farmers with limited digital experience.

In addition to shaping attitudes, FC has also been shown to have a significant direct influence on farmers' behavioral intentions to adopt e-commerce. This is reinforced by the findings of Venkatesh et al. (2012) in the UTAUT2 framework, which stated that FC is one of the main predictors of behavioral intentions, especially in individuals who are new to technology or are in the early stages of using digital systems. In the context of developing countries, Ye et al. (2024) also emphasized that FC plays a crucial role in encouraging e-commerce adoption by MSMEs, because the availability of external support is a crucial factor in overcoming internal limitations. Thus, the greater the farmers' perception of available support, the more likely they are to have a positive attitude and a strong desire to integrate e-commerce as part of their marketing system.

Attitude

The results of this study indicate that attitude has a significant influence on farmers' behavioral intention to adopt e-commerce, while also acting as a mediating variable between performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC) on that behavioral intention. This finding is consistent with the Theory of Planned Behavior framework (Ajzen, 1991), which places attitude as a central factor in shaping an individual's behavioral intention towards an action. In the context of this study, farmers' perceptions of the benefits of using e-commerce (PE), ease of use (EE), social support from farmer groups and extension workers (SI), and the availability of infrastructure and training (FC) not only have a direct impact on intention, but also indirectly through the formation of prior attitudes. This means that farmers who have a positive perception of technology will be more likely to have a supportive attitude, which then encourages their intention to actually use e-commerce as a means of marketing agricultural products.

This study reinforces previous findings, such as those by Otter & Deutsch (2023) and Xiang & Guo (2023), which showed that positive attitude is an affective-cognitive factor linking initial perceptions to behavioral decisions in digital technology adoption, particularly in the agricultural sector. Thus, attitude serves as a crucial psychological element that converts external factors into internal commitment to behavioral change. This mediating role suggests that the success of e-commerce adoption strategies among farmers is largely determined by the success of building positive attitudes through the provision of information, training, and user-friendly experiences.

Knowledge Experience Barriers

KEB can mediate the influence of EE on Farmers' Behavioral Intention of Ecommerce. The results of this study reveal that Knowledge Experience Barriers (KEB) act as a significant mediating variable in bridging the influence of performance expectancy (PE) and effort expectancy (EE) on rice farmers' behavioral intention to adopt e-commerce. KEB describes cognitive and practical barriers that arise due to farmers' limited knowledge, experience, and confidence in using digital technology. In this context, even though farmers believe that e-commerce can provide benefits (PE) and is considered easy to use (EE), their intention to adopt it can be hampered if they feel they do not understand how to use it or do not have direct experience with the system. This means that positive perceptions of benefits and ease of use will not be fully converted into behavioral intentions without an adequate level of cognitive and experiential readiness. These findings align with research by Xiao et al. (2024), which emphasized that knowledge and experience barriers play a significant role in technology-based decision-making, particularly among new adopters or those from communities with low digital literacy. Similarly, Doanh et al. (2022), in their study of smart agriculture adoption in Vietnam, found that perceived benefits do

not necessarily shape technology adoption intentions if farmers experience barriers to understanding or accessing the technology. In other words, KEB can act as a bottleneck, limiting the positive impact of PE and EE on behavioral intentions.

The novelty of this study lies in its comprehensive integration of the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) with contextual moderating and mediating variables tailored specifically to the realities of rice farmers in rural Indonesia. While previous studies have explored the adoption of digital platforms in agriculture, this research offers several distinctive contributions. First, it introduces Knowledge Experience Barriers (KEB) as a novel mediating construct that captures the psychological and experiential limitations farmers face, bridging the gap between perceived ease of use or perceived usefulness and behavioral intention. This construct has rarely been investigated in e-commerce adoption within agricultural communities, particularly in developing countries.

Digital Literacy

The results of this study indicate that Digital Literacy (DL) does not act as a significant mediator in the relationship between farmers' attitudes and behavioral intentions in adopting e-commerce. Although DL is conceptually an important factor that enables individuals to operate technology effectively (Ng, 2012), in the context of this study, digital literacy is not strong enough to bridge farmers' positive attitudes towards the intention to actually adopt e-commerce. This suggests that although farmers have basic digital skills and a supportive attitude towards technology, other factors such as community support, trust in digital platforms, or psychological barriers may be more dominant in influencing their behavioral intentions. By definition, digital literacy encompasses an individual's ability to independently access, understand, evaluate, and utilize information technology including smartphone use, digital transactions, and navigating e-commerce applications.

This observation contrasts with findings from Malaysia and Vietnam (Nguyen et al., 2023; Rahman et al., 2024), where digital literacy had a stronger influence, highlighting the importance of contextual differentiation across Southeast Asia. Therefore, the evidence indicates that in Yogyakarta's rural communities, digital literacy alone cannot overcome social and infrastructural constraints. Policy implications are clear: local governments and extension agencies should integrate digital skills training with social trust-building programs, financial literacy, and cooperative-based mentoring. Combining technical and socio-cultural interventions will ensure that the positive attitudes developed among farmers translate into actual and sustained e-commerce participation.

Conclusion

This study offers a novel theoretical contribution by integrating the Knowledge Experience Barriers (KEB) construct into the combined UTAUT2–TPB framework an approach that has rarely been applied in prior agricultural and rural technology adoption research. This integration provides a more holistic understanding of farmers' adoption behavior by linking cognitive and experiential readiness to traditional determinants such as performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC). From a practical perspective, the findings emphasize that improving digital literacy and strengthening government facilitation programmes are critical prerequisites for successful e-commerce adoption. Digital literacy, while conceptually vital, is shown to be insufficient on its own; it must be complemented by social mentoring, continuous training, and structural support from local governments. Accordingly, district-level

agricultural agencies should design targeted interventions such as digital training hubs, cooperative-led mentorship, and integrated market access platforms to bridge the cognitive and infrastructural gaps that hinder adoption.

Based on the findings of this study, it can be concluded that technological factors such as PE, EE, SI, and FC significantly influence the attitudes of rice farmers in Yogyakarta in adopting e-commerce. In addition to their direct impact, these four factors also have an indirect influence through the mediation of attitude, which acts as an important bridge in shaping technology adoption intentions. The inclusion of KEB as a mediating variable further underscores the role of cognitive preparedness and experiential learning as critical enablers of digital adoption extending beyond the conventional focus on perceived usefulness and ease of use. On the other hand, KEB proved to be a significant barrier in the adoption process, mediating the influence of PE and EE on behavioral intentions, and thereby highlighting the importance of knowledge and experience readiness in overcoming digital constraints. Meanwhile, DL did not act as a significant mediator between attitude and behavioral intentions, suggesting that skill development alone will not guarantee behavioral change without supportive ecosystems.

Overall, the results of this study emphasize the importance of an integrated strategy that combines perceived benefits, ease of use, social influence, infrastructure support, knowledge readiness, and positive attitudes to effectively encourage e-commerce adoption among rice farmers as part of Indonesia's broader digital agricultural transformation agenda. By incorporating both psychological and structural perspectives, this model provides actionable insights for policymakers and practitioners seeking to build inclusive, technology-driven rural economies.

Limitation and Future Research

This study has several limitations, including its limited geographic coverage of rice farmers in the Yogyakarta region, which makes the results difficult to generalize to farmers in other parts of Indonesia. Regional and cultural variations such as differences in digital infrastructure, market accessibility, and community norms across provinces like Central Java, West Nusa Tenggara, or South Sulawesi may influence farmers' readiness and willingness to adopt e-commerce differently. Therefore, caution should be exercised in extending these findings to broader agricultural populations. Another limitation concerns the reliance on self-reported behavioral intention, which may not necessarily reflect actual adoption behavior. Farmers' stated intentions might differ from their real actions once confronted with practical or economic constraints. To address this, future research is encouraged to conduct longitudinal or panel studies that track behavioral changes over time, thereby providing stronger evidence of causality between attitude and adoption behavior.

Additionally, because the data collection process involved assistance from village officials and extension workers to help farmers understand the questionnaire, there is a potential for social desirability bias where respondents might provide favorable answers to align with perceived expectations of authority figures. Future studies should employ triangulation methods, such as in depth interviews or observational approaches, to minimize this bias and strengthen the validity of responses. It is also suggested that future research integrate additional moderating variables such as financial literacy and trust in online systems, which may interact with digital literacy and knowledge experience barriers in shaping behavioral intention. Furthermore, adopting a mixed methods approach combining surveys with qualitative case studies could better capture the social and cultural nuances that influence farmers' perceptions and decision-making processes.

In summary, future studies should broaden the scope across multiple regions, include behavioral tracking components, and incorporate socio-economic moderators to build a more holistic and contextually grounded understanding of digital adoption in Indonesia's agricultural sector.

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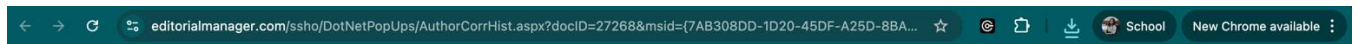
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Abstract

SURAT PERNYATAAN TANGGUNG JAWAB BELANJA

Yang bertanda tangan di bawah ini :

Nama : Dr Dra SETYANI DWI LESTARI M.E

Alamat : -

berdasarkan Surat Keputusan Nomor 124/C3/DT.05.00/PL/2025 dan Perjanjian / Kontrak Nomor 0965/LL3/AL.04/2025, A/UBL/DRPM/000/113/06/25 mendapatkan Anggaran Penelitian Peningkatan Daya Saing Petani Padi dengan Transformasi Pemasaran Berbasis Digital Pada Kelompok Tani Unggul Yogyakarta Sebesar Rp. 111.420.000

Dengan ini menyatakan bahwa :

1. Biaya kegiatan Penelitian di bawah ini meliputi :

No	Uraian	RAB 100%	Realisasi
1	Bahan TK dan bahan penelitian habis pakai terdiri dari notebook untuk kegiatan FGD, fotokopi kuesioner sebanyak 420 set, materai untuk kebutuhan administrasi, kertas HVS untuk mencetak dokumen, spanduk dan standing banner untuk pelaksanaan kegiatan, pena untuk pengisian kuesioner oleh responden, serta perlengkapan administrasi seperti amplop, map, steples, dan klip untuk pengarsipan dokumen.	Rp. 2.959.000	Rp. 2.959.000
2	Pengumpulan Data Pengumpulan data meliputi honor petugas survei untuk pengisian 420 kuesioner di Yogyakarta, biaya transportasi mulai dari perjalanan bandara CGK, sewa kendaraan selama penelitian di Yogyakarta, transport menuju dan dari Bandara Jogja, serta transportasi dalam kota untuk tiga kali kunjungan. Selain itu, termasuk biaya tiket pesawat PP Jakarta–Yogyakarta untuk 4 orang tim peneliti, uang harian bagi petugas kebersihan selama kegiatan, serta uang harian bagi tim peneliti. Fasilitas penginapan disediakan untuk 3 orang tim peneliti selama 5 malam dan 2 orang tim peneliti selama 2 malam. Biaya konsumsi mencakup makan dan snack untuk FGD dengan petani unggul serta FGD bersama pemerintah dan pakar. Kegiatan ini juga didukung pembantu lapangan sebanyak 3 orang selama kegiatan, serta transportasi wawancara dengan 17 petani padi, honor narasumber 4 orang pakar/akademisi, dan 3 pejabat pemerintah daerah.	Rp. 68.796.000	Rp. 68.796.000
3	Analisis Data Analisis data mencakup honor pengolah data untuk kegiatan analisis statistik, pengolahan data kualitatif, dan penyusunan manual book prototype sebagai panduan penggunaan sistem yang dikembangkan. Seluruh kegiatan ini ditujukan untuk memastikan data penelitian diolah secara komprehensif, baik secara kuantitatif maupun kualitatif, sehingga hasil analisis dapat dipertanggungjawabkan dan mendukung penyusunan model serta luaran penelitian yang dijanjikan.	Rp. 14.265.000	Rp. 14.265.000
4	Sewa Peralatan Sewa peralatan dalam penelitian ini difokuskan untuk mendukung pengembangan website e-commerce sebagai prototipe sistem pemasaran digital bagi petani. Biaya yang digunakan meliputi sewa server untuk penyimpanan data dan menjalankan aplikasi website secara daring, pembelian domain agar website memiliki identitas yang profesional, serta lisensi perangkat lunak pendukung seperti framework	Rp. 14.300.000	Rp. 14.300.000

No	Uraian	RAB 100%	Realisasi
	desain, plugin keamanan. Seluruh kebutuhan ini ditujukan untuk memastikan pengembangan website berjalan lancar, aman, dan sesuai dengan kebutuhan penelitian sehingga menghasilkan prototipe sistem pemasaran digital yang fungsional dan siap diimplementasikan di lapangan.		
5	Pelaporan Luaran Wajib Pembayaran 2 HKI untuk model dan prototipe	Rp. 11.100.000	Rp. 11.100.000
6	Lain-lain	Rp. 0	Rp. 0
Realisasi (100 %)			Rp. 111.420.000

2. Jumlah uang tersebut pada angka 1, benar-benar dikeluarkan untuk pelaksanaan kegiatan Penelitian dimaksud.

Demikian surat pernyataan ini dibuat dengan sebenarnya.

Jakarta, 11-12-2025, Ketua

Dr Dra SETYANI



NIP/NIPK 3671125311600002